FINAL REPORT

California Environmental Protection Agency
Department of Toxic Substances Control

Removal Action Workplan
Marsh Crust at the East Housing Area
Alameda Point
Alameda, California

May 2000

In Cooperation with

Catellus Development Corporation

and The City of Alameda

Prepared by:
Environmental Resources Management
1777 Botelho Drive, Suite 260
Walnut Creek, CA 94596

ERM

ENVIRONMENTAL RESOURCES MANAGEMENT

FINAL REMEDIAL ACTION PLAN APPROVAL RECORD
SIGN-OFF SHEET

Final Removal Action Workplan for Marsh Crust at the East Housing Area, Alameda Point, Alameda, California
Site Name

Mary Rose Ortiza — May-25, 2000
Project Manager — **Date**

25 MAY 00
Unit Chief — **Date**

5-25-00
Site Mitigation Branch Chief — **Date**

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Jay N. Patil (dac for)
Jay N. Patil, P.E.
Principal-in-Charge

Michael E. Quillin
Michael E. Quillin, R.G.
Project Manager

Kim Scully
Kim Scully
Project Scientist

Environmental Resources Management
1777 Botelho Drive, Suite 260
Walnut Creek, CA 94596

ERM®

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LIST OF ACRONYMS

Airdrome	San Francisco Bay Airdrome
ARARs	Applicable or Relevant and Appropriate Requirements
ARRA	Alameda Reuse and Redevelopment Authority
ATSDR	Agency for Toxic Substances Disease Registry
BAAQMD	Bay Area Air Quality Management District
bgs	Below ground surface
BRAC	Base Realignment and Closure Act
Ca-HSC	California Health and Safety Code
Cal/EPA	California Environmental Protection Agency
Catellus	Catellus Development Corporation
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFG	California Department of Fish and Game Code
CFR	Code of Federal Regulations
COC	Constituent of concern
COPC	Chemicals of potential concern
DMB	Data management benchmark
DOD	Department of Defense
DTSC	Department of Toxic Substances Control
EBS	Environmental Baseline Survey
ERM	Environmental Resources Management
FISCO Alameda	Fleet and Industrial Supply Center Oakland, Alameda Facility/Alameda Annex
FOST	Finding of Suitability to Transfer
FR	Federal Register
FS	Feasibility Study
FSEBS	Final Sector Environmental Baseline Survey
FWBZ	First water bearing zone
H&S	Health and safety
HHRA	Human Health Risk Assessment
IR	Installation Restoration Program
IT	International Technology Corporation
mg/kg	Milligrams per kilogram
MLLW	Mean lower low water
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command

NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NO_x	Nitrogen oxides
NPL	National Priorities List
NSC	Naval Supply Center
O&M	Operation and maintenance
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAHs	Polynuclear aromatic hydrocarbons
PA/SI	Preliminary assessment/site inspection
PCBs	Polychlorinated biphenyls
ppm	parts per million
PRC	PRC Environmental Management, Inc.
PRG	Preliminary Remedial Goal
PWC	Navy Public Works Corps
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RAW	Removal Action Workplan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RME	Reasonable maximum exposure
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SVOCs	Semivolatile organic compounds
SWRCB	California State Water Resources Control Board
TBC	To-be-Considered
TOC	Total organic carbon
TPH	Total petroleum hydrocarbon
TRPH	Total recoverable petroleum hydrocarbon
TtEMI	Tetra Tech EM Inc.
USC	United States Code
USEPA	United States Environmental Protection Agency
UST	Underground storage tank
USFWS	US Fish and Wildlife Service
VOCs	Volatile organic compounds

EXECUTIVE SUMMARY

The purpose of this Removal Action Workplan (RAW) is to document, for the Administrative Record, the California Environmental Protection Agency, Department of Toxic Substances Control's (DTSC's) decision to undertake a removal action for the marsh crust, a potentially contaminated soil horizon at the Alameda Point East Housing Area (site), which is located on the eastern edge of Alameda Point in the city of Alameda, Alameda County, California. This document has been prepared in association with site closure activities and transfer to the City of Alameda pursuant to the Base Realignment and Closure Act of 1988 (BRAC) and the Defense Base Realignment and Closure Act of 1990.

The remedy would define restrictions on excavation, and would bind all future property owners to these restrictions by recordation of a covenant. Specifically, the remedy addresses a deep layer of historical contaminated sediment known as "marsh crust" at parcels 170 and 171, which encompass approximately 63 acres of the former Alameda Naval Air Station. Alameda Naval Air Station closed in 1997. The base was renamed Alameda Point by the City of Alameda, which is negotiating a conveyance of the property to the city from the Navy. While Marsh Crust exists beyond the boundary of Parcels 170 and 171, and indeed beyond the boundary of Navy-owned property, this remedy applies only to marsh crust under Parcels 170 and 171.

The RAW is consistent with the Navy's *Final Feasibility Study for the Marsh Crust and Ground Water at Fleet and Industrial Supply Center Oakland, Alameda Facility/ Alameda Annex and Feasibility Study for the Marsh Crust and Former Subtidal Area at Alameda Point*, (Final FS) (Tetra Tech Environmental Management, Inc. [TtEMI], 6 January 2000), which is currently being reviewed by DTSC. In the RAW, the Fleet and Industrial Supply Center Oakland, Alameda Facility/ Alameda Annex properties are collectively referred to as FISCO Alameda.

This RAW is consistent with applicable sections of Chapter 6.8, California Health and Safety Code (Ca-HSC), and presents and evaluates the following:

- Site conditions and results of applicable historical soil and ground water investigation activities;

- A Remedial Action Objective (RAO) developed for media-specific and area-specific protection of human health and the environment;
- Remedial action alternatives for the site; and
- Recommendations for remedial actions and associated monitoring and reporting that are consistent with the terms of the Final FS in ensuring protection of human health and the environment at the site.

From 1900 to 1939, the area now constituting the site was covered with fill soil obtained from unknown sources, although it is likely that the fill came from dredge spoils from the Oakland Inner Harbor. According to a figure included in the Final FS, the site is divided roughly in half diagonally into two periods during which various portions of the area were covered with fill. These dates are 1887 through 1915 for the southeastern half, and 1930 through 1939 for the northwestern half.

The site occupies approximately 63 acres of relatively level property on the western portion of Alameda Island just east of and across Main Street from the main Alameda Point property. The site is approximately one-quarter mile south of Oakland Inner Harbor, and two-thirds mile north of San Francisco Bay. The site is bounded by Atlantic Avenue on the south, Arnold Avenue and warehouses within FISCO Alameda on the north, Main Street on the west, and the College of Alameda campus on the east.

Manufactured gas plants and an oil refinery, which were present near the future location of the site, operated from the late 1800s into the 1920s. These facilities are believed to have discharged petroleum waste to adjacent marshlands during their operation. The discharge was rich in semivolatile organic compounds (SVOCs), including polynuclear aromatic hydrocarbons (PAHs). The waste spread over much of the surface of the surrounding marsh and was deposited on the marsh surface through tidal actions, leaving a layer of contaminated sediment under what would later become the Alameda Naval Air Station. Fill material, dredged during improvement of the Oakland Inner Harbor and surrounding San Francisco Bay sediments, was placed as fill beginning in 1887 and encapsulated the former marsh crust under the fill.

The primary constituents of concern (COCs) are PAHs, a class of chemicals found naturally in petroleum products, including gasoline, diesel, and certain mineral spirits, and also as by-products of coal or oil gasification. PAHs are found throughout the environment in the air, water, and soil. Of the more than 100 distinct PAH compounds, the following 10 compounds have been identified as COCs in the marsh crust:

benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo[a,h]anthracene, ideno[1,2,3-cd]pyrene, pyrene, fluoranthene, and phenanthrene. Of these 10, only the first seven have demonstrated carcinogenic potential in animal or human studies, and are thus considered the primary COCs for the purposes of this document. Although considered to be non-carcinogenic, the remaining three PAHs are considered COCs due to their potential to cause adverse systemic, reproductive, and developmental health effects. Other COCs that have been identified at the site are volatile organic compounds in ground water under part of the site.

RAOs are either medium-specific or area-specific goals for protecting human health. Where possible, an RAO should specify (1) each COC; (2) the exposure route and each receptor; and (3) an acceptable contaminant concentration or range of concentrations for each exposure pathway and media. The recommended RAO for human health at the site is to prevent human exposure to PAHs by restricting excavation into the marsh crust unless proper health and safety and disposal procedures are followed.

The four remedial alternatives developed in the RAW for evaluation of their ability to meet the RAO are:

- Remedial Alternative 1: No Action;
- Remedial Alternative 2: Institutional Controls;
- Remedial Alternative 3: Excavation and Off-Site Disposal; and
- Remedial Alternative 4: Excavation and On-Site Treatment with Thermal Desorption.

The detailed analysis of alternatives is based on the nine evaluation criteria specified by the *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP) (Title 40 of the Code of Federal Regulations [CFR], Part 300.430(e)(9)(iii)) and the guidance for conducting remedial investigations and feasibility studies under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The nine evaluation criteria are:

- Overall protection of human health and the environment;
- Compliance with applicable or relevant and appropriate requirements (ARARs);
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;

- Short-term effectiveness;
- Implementability;
- Cost;
- State acceptance; and
- Community acceptance.

For the marsh crust at the site, the comparative analysis indicates that Alternative 2, consisting of a combination of institutional controls, provides overall protection of human health and the environment, meets the threshold criteria for remedy selection, and is cost-effective.

ADMINISTRATIVE RECORD LIST

The Administrative Record List for the East Housing Area contains all documents that were relied upon or considered by DTSC when selecting the remedial alternatives. The Administrative Record List is presented in the appendix to the Executive Summary.

Appendix to the Executive Summary
Administrative Record List

ADMINISTRATIVE RECORD LIST

DOCDATE:	March 2000
DOCTYPE:	Feasibility Study
TITLE/SUMM:	Final Feasibility Study for Marsh Crust
AUTHOR/AFF:	Tetra Tech EM Inc.

DOCDATE:	January 1996
DOCTYPE:	Remedial Investigation Report
TITLE/SUMM:	Final Remedial Investigation Report, Fleet and Industrial Supply Center Oakland, Alameda Annex and Alameda Facilities
AUTHOR/AFF:	PRC Environmental Management, Inc.

DOCDATE:	May 1996
DOCTYPE:	Environmental Baseline Survey
TITLE/SUMM:	Environmental Baseline Survey/Phase 2A Sampling Draft Parcel-Specific Data Evaluation Summaries Zone 16: The Housing Zone
AUTHOR/AFF:	International Technology Corporation.

DOC DATE:	May 1996
DOCTYPE:	Environmental Baseline Survey
TITLE/SUMM:	Environmental Baseline Survey/Phase 2B Sampling Draft Parcel-Specific Data Evaluation Summaries Zone 16: The Housing Zone
AUTHOR/AFF:	IT Corporation

DOCDATE:	March 1999
DOCTYPE:	Comprehensive Guide
TITLE/SUMM:	Environmental Baseline Survey Comprehensive Guide
AUTHOR/AFF:	IT Corporation

DOCDATE:	January 1996
DOCTYPE:	Remedial Investigation Report
TITLE/SUMM:	Final Remedial Investigation Report, FISCO Alameda Facility/ Alameda Annex Site. Alameda, California
AUTHOR/AFF:	PRC Environmental Management, Inc.

DOCDATE:	November 1998
DOCTYPE:	Ground Water Monitoring Report
TITLE/SUMM:	Fleet and Industrial Supply Center Oakland Alameda Facility/ Alameda Annex, Alameda, California. Final Cumulative Ground water Monitoring Report (1994 to 1996). Department of Navy Engineering Field Activity West Naval Facilities Engineering Command. San Bruno, California
AUTHOR/AFF:	Tetra Tech EM Inc.

DOCDATE:	January 1999
DOCTYPE:	Remedial Investigation Report
TITLE/SUMM:	OU-1 Remedial Investigation Report, Draft Final, Alameda Point. Alameda, California
AUTHOR/AFF:	Tetra Tech EM Inc.

DOCDATE:	October 1999
DOCTYPE:	Ground Water Beneficial Use Report
TITLE/SUMM:	Fleet and Industrial Supply Center, Oakland Alameda Facility/ Alameda Annex Alameda, California, Final Base-Wide Ground Water Beneficial Use Report Shallow Water Bearing Zone
AUTHOR/AFF:	Tetra Tech EM Inc.

DOCDATE:	January 2000
DOCTYPE:	Final Feasibility Study
TITLE/SUMM:	Fleet and Industrial Supply Center, Oakland the Annex Site, Alameda, California, Draft Final Focused Feasibility Study for the Marsh Crust and Ground Water at the Fleet and Industrial Supply Center Oakland, Alameda Facility/ Alameda Annex and Feasibility Study for the Marsh Crust and Former Subtidal Area at Alameda Point. Alameda, California
AUTHOR/AFF:	Tetra Tech EM Inc.

DOCDATE:	November 1999
DOCTYPE:	Beneficial Use Report
TITLE/SUMM:	Determination of the Beneficial Uses of Ground Water, Alameda Point, Alameda, California, Revised Draft
AUTHOR/AFF:	Tetra Tech EM Inc.

1.0 INTRODUCTION

This Removal Action Workplan (RAW) addresses remedial options associated with the marsh crust, a potentially contaminated soil horizon at the Alameda Point East Housing Area (site), which is located on the eastern edge of Alameda Point in the city of Alameda, Alameda County, California (Figure 1-1). The remedy would define restrictions on excavation, and would bind all future property owners to these restrictions by recordation of a covenant. Specifically, the remedy addresses a deep layer of historically contaminated sediment known as "marsh crust" at parcels 170 and 171, which encompass approximately 63 acres of the former Alameda Naval Air Station (NAS). Alameda NAS closed in 1997. The base was renamed Alameda Point by the City of Alameda, which is negotiating a conveyance of the property to the City of Alameda from the Navy. While Marsh Crust exists beyond the boundary of Parcels 170 and 171, and indeed beyond the boundary of Navy-owned property, this remedy applies only to marsh crust under Parcels 170 and 171.

This document has been submitted to the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) for review and approval in association with site closure activities and transfer to the City of Alameda pursuant to the Base Realignment and Closure Act of 1988 (BRAC) and the Defense Base Realignment and Closure Act of 1990. The document is consistent with the Navy's *Final Feasibility Study for the Marsh Crust and Ground water at Fleet and Industrial Supply Center Oakland, Alameda Facility/ Alameda Annex, and Feasibility Study for the Marsh Crust and Former Subtidal Area at Alameda Point* (Final FS) (Tetra Tech Environmental Management Inc. [TtEMI], 2000), which is currently being reviewed by DTSC. In this RAW, the Fleet and Industrial Supply Center Oakland, Alameda Facility/ Alameda Annex properties are collectively referred to as FISCO Alameda.

The Alameda Point East Housing Area comprises Parcels No. 170 and 171 of the former Alameda NAS property and was used as military family housing from 1966 to 1997. Alameda Point is undergoing base closure and will be released for public use upon completion of the Navy's closure activities. The site has been segregated from the remainder of Alameda Point for closure and transfer in conjunction with early transfer activities at FISCO Alameda. In 1999, the former Alameda NAS was listed on the United States Environmental Protection Agency (USEPA) National

Priorities List (NPL) of hazardous waste sites. Marsh crust is not included in the NPL listing (USEPA NPL Site Narrative at Listing, http://www.epa.gov/superfund/sites/npl/nar1560.htm) and is therefore subject to direct regulation by DTSC. As stated in USEPA's Narrative, with appropriate regulatory concurrence, additional uncontaminated property at the former Alameda NAS is not considered part of the NPL site.

This RAW is organized as follows:

- The remainder of Section 1 addresses the objectives, approach, and regulatory basis for the RAW.
- Section 2 presents a discussion of the site's background and a summary of previous soil and ground water investigations for the site and surrounding area, the site's physiography, and general geologic and hydrologic conditions for the area.
- Section 3 describes the site's geology, hydrology, and soil and ground water chemistry based on results of previous investigations.
- Section 4 summarizes information regarding potential human health and environmental effects from exposure to the primary constituents of concern (COCs) in the marsh crust at the site, specifically polynuclear aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs) in ground water.
- Section 5 addresses the Remedial Action Objective (RAO) presented in the Final FS report.
- Section 6 describes remedial alternatives developed for evaluation of their ability to meet this RAO.
- Section 7 evaluates the remedial alternatives according to the criteria of effectiveness, implementability, and cost.
- Section 8 provides a comparative analysis of the remedial alternatives and presents a recommendation for the appropriate alternative.
- Section 9 presents references cited or reviewed in preparation of the RAW.
- Tables and figures referenced in this document are presented at the end of the sections in which they are referenced.
- Appendix A presents the Marsh Crust and Ground Water Restrictive Land-Use Covenant.

- Appendix B presents the City of Alameda's Marsh Crust Excavation Ordinance.
- Appendix C presents the cost estimates for each remedial alternative.

1.1 *REGULATORY BASIS FOR THE REMOVAL ACTION WORKPLAN*

The Navy's investigation of the site under the Environmental Baseline Survey (EBS) program concluded that the Alameda Point East Housing Area is amenable to a Finding of Suitability to Transfer (FOST) because no significant contamination was found. This RAW was prepared to address regulatory agency concerns about the possibility that future construction could bring contaminated material (specifically, soil contaminated with PAHs) from the marsh crust to the surface where site users could be exposed. The Final FS report states that the RAO for the marsh crust is to "prevent exposure to hazardous substances by restricting excavation into the former subtidal area and marsh crust unless proper health and safety (H&S) and disposal procedures are followed."

As defined by California Health and Safety Code (Ca-HSC) Section 25323.1, a RAW is a workplan "...developed to carry out a removal action, in an effective manner, which is protective of the public health and safety and the environment." A RAW is appropriate when the estimated cost of the proposed removal action is less than $1,000,000 (the estimated cost of the remedy recommended herein is approximately $50,000). If estimated costs associated with implementation of the chosen removal action will exceed $1,000,000, a Remedial Action Plan (RAP) consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, is required. The estimated cost associated with the remedial alternative recommended in this RAW is significantly less than $1,000,000.

Essential elements of the RAW are:

- A description of the on-site contamination;
- The goals to be achieved by the removal action; and
- Any alternative removal options that were considered and the basis for subsequent rejection or acceptance.

Although referenced as a requirement for RAWs in Ca-HSC section 25323.1, a detailed engineering plan for conducting the proposed remedial action has not been presented in this RAW because the proposed remedial

action is a combination of institutional controls (Restrictive Land-Use Covenant and Marsh Crust Ordinance), which would not involve any construction or engineering processes. The specific institutional controls and monitoring program to be implemented by the State of California and, where appropriate, in conjunction with the City of Alameda, are described in Section 8.

1.2 *OBJECTIVES OF THE REMOVAL ACTION WORKPLAN*

The RAW was developed to present and evaluate the following:

- Site conditions and results of historical soil and ground water investigation activities;
- RAOs developed for media-specific and area-specific protection of human health and the environment;
- Remedial action alternatives for the site;
- Implementation of the remedy as a final remedy for the site; and
- Recommendations for remedial actions and associated monitoring and reporting that ensure protection of human health and the environment at the site.

1.3 *SCOPE OF THE REMOVAL ACTION WORKPLAN*

This discussion identifies the scope of activities performed to meet the stated objectives for the RAW. To develop the summary of site conditions and historical soil and ground water investigations at the site, reports and documents dating back to the late 1980s were reviewed, when investigation in the area of the site was initiated. These reports and documents are included in the Administrative Record List in the appendix to the executive summary.

Evaluation of the RAOs in the RAW includes consideration of Applicable or Relevant and Appropriate Requirements (ARARs). Applicable requirements are promulgated at the federal and/or state level to specifically address a hazardous constituent, remedial action, location, or other circumstances at a hazardous waste site. Relevant and appropriate requirements, while not directly applicable to circumstances at a hazardous waste site, address problems or situations similar to those encountered at a hazardous waste site. In addition to ARARs, the degree

to which current natural and man-made conditions are achieving the RAOs was also evaluated.

The four remedial alternatives developed by the Navy for the marsh crust RAOs were used in preparation of this analysis. Although the FS has not been completed, information contained therein is considered relevant to this decision document. The alternatives ranged from a "no action" scenario to complete excavation and either on-site treatment or off-site removal of PAH-impacted marsh crust soils buried at the site. Conceptual designs for each alternative were developed, followed by an evaluation of each alternative based on the criteria of effectiveness, implementability, and cost. These criteria are consistent with USEPA guidance for conducting remedial investigations and feasibility studies pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as contained in CERCLA and adopted in Chapter 6 of the Ca-HSC. A comparative analysis based on these criteria was performed to provide a basis for selecting the remedial action appropriate to site conditions. Finally, recommendations for appropriate remedial actions were developed, based on comparative analysis of criteria for each alternative.

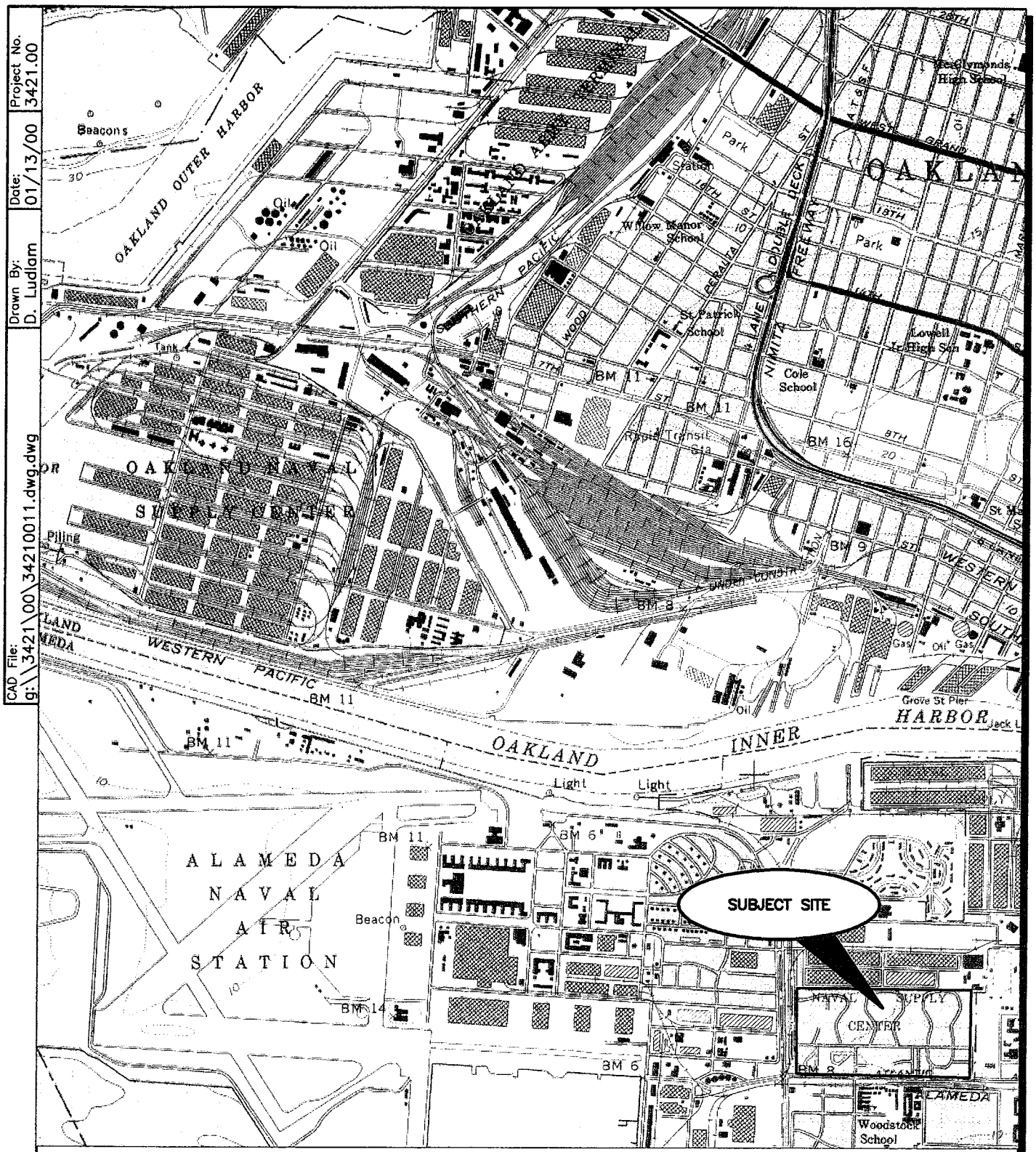

Figure 1-1

Site Location Map

Alameda Point - East Housing Area

Alameda, California

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References:
U.S.G.S. 7.5 Minute Series (Topographic Oakland West Quadrangle, California)
Dated: 1959; Photorevised 1980

2.0 SITE BACKGROUND

This section describes the site and surrounding area, presents site history, and outlines the history of previous environmental investigations. The site, local constructed and natural features, and soil boring locations related to previous investigations are illustrated in Figure 2-1. Much of the material contained in this section is from the Final FS.

2.1 SITE DESCRIPTION

Figure 2-1 shows the site and adjacent areas frequently referenced in this report. The site occupies approximately 63 acres of relatively level property on the western portion of Alameda Island just east of the main Alameda Point property across Main Street. The site is approximately one-quarter mile south of Oakland Inner Harbor, and two-thirds mile north of San Francisco Bay. The site consists of two parcels (Parcel Numbers 170 and 171 of Zone 16 at Alameda Point). The site is bounded by Atlantic Avenue on the south, Arnold Avenue and warehouses within FISCO Alameda on the north, Main Street on the west, and the College of Alameda campus on the east. Two-story apartment buildings and townhomes cover approximately 20 to 25 percent of the site while approximately 75 to 80 percent is open space consisting of paved roads and parking lots, and grassy or landscaped recreation areas. According to the *Final Sector Environmental Baseline Survey Zones 6, 13, 14, 16 (Partial), 17, 19 and 22, Naval Air Station Alameda Volume I – Text, Tables, Figures* (FSEBS) (PRC Environmental Management, Inc. [PRC], Environmental Resources Management [ERM], and GAIA Consulting, Inc., 1996), the site contains electrical, water, sanitary sewer, and storm sewer lines. No underground storage tanks (USTs), aboveground storage tanks, oil/water separators, or fuel lines are located on the site. In addition, no Navy Installation Restoration Program (IR) sites have been identified within the site.

2.1.1 *Marsh Crust Conceptual Model*

Manufactured gas plants and an oil refinery, which were present near the future location of the site operated from the late 1800s into the 1920s. These facilities are believed to have discharged petroleum waste to adjacent marshlands during their operation. The discharge was rich in semivolatile organic compounds (SVOCs), including PAHs. The waste spread over much of the surface of the surrounding marsh and was

deposited on the marsh surface through tidal actions, leaving a layer of contaminated sediment under what would later become the Alameda NAS. Fill material, dredged during improvement of the Oakland Inner Harbor and surrounding San Francisco Bay sediments, was placed as fill beginning in 1887, and encapsulated the former marsh crust under the fill (International Technology Corporation [IT Corporation], 1999a. *Environmental Baseline Survey Comprehensive Guide: History of NAS Alameda and Alameda Point* [March, 1999]).

Borings drilled at the former Alameda NAS and the adjacent FISCO Alameda have encountered marsh crust and related deposits over a large geographic area that exceeds 700 acres (TtEMI, 1999, *Operable Unit 1 Remedial Investigation Report [OU-1 RI report]*; IT Corporation, 1999a). Concentrations of benzo(a)pyrene, a highly carcinogenic compound, commonly exceed the residential preliminary remedial goal (PRG) of 0.056 milligrams per kilogram (mg/kg) by several orders of magnitude. Based on the conceptual model of how the marsh crust was deposited, the marsh crust is believed to exist throughout the area in a reasonably predictable, planar zone, but it may not exist as a continuous layer because of the presence of tidal channels and other phenomena affecting the original deposition. The interface between fill material and the historic surface of the marsh or subtidal deposits is inferred to be present at depths of 4 to 15 feet below ground surface (bgs) at Parcels 170 and 171. Marsh crust as originally deposited may therefore be present at depths of 4 to 15 feet. The remedy assumes that this is the case.

Chemicals consistent with marsh crust have been found to the west of Parcels 170 and 171 (Site 7 of Operable Unit Number 1 [OU-1] at Alameda Point) at depths ranging from 6 to 10 feet below ground surface. None of the soil borings within the boundaries of Parcels 170 and 171 have encountered marsh crust. However, a boring advanced in February 2000 within the southwestern portion of the Warehouse Area, immediately north of Parcel 171, encountered a layer of organic plant matter (uncontaminated), interpreted to be marsh crust, at a depth of approximately 9.5 feet immediately overlying native sediments. This location may, based on historical mapping of tidal flats in the area, be within a former tidal slough, a condition that has not been encountered at any other location within Parcels 170 and 171. As a result of these findings, it must be concluded that, although not encountered with any borings at the site proper, the occurrence of marsh crust within Parcels 170 and 171 is possible.

DTSC believes that there is no set of rational investigation objectives that can be identified that would lead to a conclusive data set. DTSC therefore believes that it is impractical to further investigate the marsh crust for the purpose of more precisely delineating the areas where marsh crust is or is not present in Parcels 170 and 171.

It is also possible that some soils from the historic marsh or the subtidal areas were disturbed during fill or other unknown activities, and may have been deposited at depths other than those of the historic marsh or subtidal soil surface. This possibility cannot be reliably proved or rationally investigated, as there are no criteria for sampling locations or depths upon which a sampling plan could be based. However, since marsh crust has not been detected at depths inconsistent with the depositional model, DTSC considers the likelihood of substantial marsh crust or subtidal soil deposits at depths different from those of the original marsh crust or subtidal surface to be minimal. DTSC therefore is not proposing to include soil at other depths in the restrictive part of this remedy.

2.2 *LAND USE HISTORY*

2.2.1 *Site Land Use History*

Until the 1920s, the facility and its surrounding areas existed as undeveloped marshlands and tidal flats along the San Francisco Bay fringe. Future land use at the site is expected to be residential. At adjacent properties, future land use is expected to be a mixture of commercial, industrial, recreational, and residential.

From 1900 to 1939, the area now constituting the site was covered with fill soil obtained from unknown sources (IT, 1999), although it is likely that the fill came from dredge spoils from the Oakland Inner Harbor. According to a figure included in the Final FS, the site is divided roughly in half diagonally into two periods during which various portions of the area were covered with fill. These dates are 1887 through 1915 for the southeastern half, and 1930 through 1939 for the northwestern half.

2.2.2 *Surrounding Area History*

The FISCO Alameda property north of the site is zoned as an M-2-G general industrial (manufacturing) district with a special government-combining overlay. The area west of the site, across Main Street, is

occupied by the main Alameda Point facility. Alameda Point is currently a mixed-use area with industrial and office space. San Francisco Bay lies to the west of Alameda Point. The area south of the site, across Atlantic Avenue, consists of residential developments. East of the site is housing, elementary and middle schools, and the College of Alameda. The Oakland Inner Harbor, which is north of FISCO Alameda and Alameda Point, contains a ferry terminal, shipyards, several marinas, and yacht clubs.

Before 1930, at least two large industrial sites (an oil refinery and a borax processing plant) were present on the western tip of Alameda Island just southwest of the current facility. The oil refinery was southeast of the borax plant at the southwestern corner of Main Street and Pacific Street. The borax plant was also located on the dry land at the southeast corner of what is now W. Atlantic Avenue and Orion Street (Sanborn-Ferris Map Company [Sanborn], 1897).

As discussed in a report on the regional history (IT, 1999), a number of industrial facilities were present before and during the period that fill soil was being applied to the area. Many of these industries are believed to have stored and used hazardous materials and generated hazardous wastes during their daily operations and manufacturing processes (PRC, 1996). In particular, lighter hydrocarbon by-products and PAH-laden sludges are likely to have been discharged directly into the waters of San Francisco Bay or Oakland Inner Harbor, or discharged directly to the marshes. Because many of these materials are lighter than water, they would have floated and been transported by tidal flows, wave action, and wind into the marsh by the historic tidal channels. Some of the discharged materials may have been deposited within the native peat and grass layer along the sides of the tidal channels and surface of the marsh, some may have been deposited in subtidal sediments, and some may have been widely distributed through wind, wave, and tidal action.

The "marsh crust" has been defined as deposited material that currently exists at an average depth of 15.3 feet bgs at FISCO Alameda, as determined by soil samples collected for the *Final Remedial Investigation (RI) Report*, FISCO Alameda Facility/Alameda Annex Site (FISCO Alameda RI report; PRC, 1996). These same materials appear to have been deposited in sediments as deep as 1 foot below mean lower low water (MLLW), which is referred to as the subtidal area in the Final FS report, approximately three quarters of a mile west of the facility. The OU-1 RI report (TtEMI, 1999a) contains soil boring logs for soil sampling and ground water monitoring well construction events within IR Site 7 of OU-

1 of Alameda Point. IR Site 7 consists of a former gasoline service station located directly across Main Street to the west of the East Housing Area. Selected soil boring data from IR Site 7 indicate that the interface between fill material and the Bay Sediments occurs at an average depth of 4.2 feet bgs (range of 2.0 to 6.5 feet bgs). Evidence of PAH-contaminated marsh crust was found at depths of approximately 6 to 10 feet bgs at two locations within IR Site 7.

A commercial airport known as the San Francisco Bay Airdrome (Airdrome) was constructed in the mid-1920s in the FISCO Alameda area immediately north of the site. The Airdrome consisted of a 2,500-foot runway, a passenger terminal, and an aircraft maintenance hangar. Maintenance of aircraft would likely have involved the use and storage of hazardous materials and the generation of associated wastes in the form of solvents, paints, and petroleum-based products (such as aircraft fuel and lubricating oil), although the Airdrome is not believed to have contributed PAH contamination to the marsh crust layer. The Airdrome reached peak operation by 1932, serving about 11,000 customers per month. Wartime activities at nearby NAS Alameda caused air traffic conflicts, resulting in closure of the Airdrome in 1941 (PRC, 1996).

The FISCO Alameda property was assigned to NAS Alameda in 1951. In 1980, the FISCO Alameda was transferred to the Naval Supply Center Oakland (Western Division Naval Facilities Engineering Command [NSC] 1988). The FISCO Alameda, in conjunction with NSC Oakland, served as the main supply facility supporting Department of Defense (DOD) operations of military fleets and shore activities in the Pacific Basin. The facility was closed in September 1998.

The western tip of Alameda Island (prior to the construction of Alameda Point) was farmed before becoming an industrial and transit center. Railroad yards and rights-of-way for Southern Pacific Railroad, Central Pacific Railroad, and small local railways were built over the site and sloughs to the north. The western terminus for the transcontinental railroad was at the southeastern corner of the site for a short period in 1869. The US Army (Army) acquired the western tip of Alameda from the City of Alameda in 1930 and began construction activities in 1931. In 1936, the Navy acquired title to the land from the Army and began building NAS Alameda in response to the military buildup in Europe before World War II. The construction involved filling the natural tidelands, marshes, and sloughs between the Oakland Inner Harbor and the western tip of Alameda Island. The fill largely consisted of dredge spoils from the surrounding San Francisco Bay and Oakland Inner

Harbor. After the United States entered the war in 1941, the Navy acquired more land to the west of the installation. Following the end of the war in 1945, the installation continued its primary mission of providing facilities and support for fleet aviation activities. During its operations as an active naval base, the installation provided berthing for Pacific Fleet ships and was a major center of naval aviation.

Alameda Point was identified for closure in September 1993. The installation ceased all naval operations in April 1997, and the Navy is currently in the process of returning the land back to the City of Alameda. The City of Alameda is working with the Alameda Reuse and Redevelopment Authority (ARRA) to determine appropriate reuse activities for the land.

Alameda Point is almost entirely modified by human activity, and a variety of industries and activities are located at the facility (including port facilities, aircraft repair facilities, office buildings, runways, and landfills). Alameda Point, including contiguous and noncontiguous properties such as constructed breakwaters, contains nine terrestrial and aquatic wildlife habitats. Major habitat types currently present at Alameda Point are described in the OU-1 RI report (TtEMI, 1999a) and include: open water areas; estuarine intertidal emergent wetlands; non-native grassland; ruderal upland vegetation; disturbed areas; beach, urban, and ornamental landscapes; and riprap. Several special status species have been identified that occur or are expected to occur at Alameda Point (U.S. Fish and Wildlife Service [USFWS], 1993; TtEMI, 1999a).

2.3 *PREVIOUS INVESTIGATION HISTORY*

This subsection discusses applicable historical investigation activities at the site and surrounding areas.

2.3.1 *Site Investigation History*

In conjunction with the BRAC, the Navy undertook the EBS process to assess the environmental concerns associated with NAS Alameda. Through the EBS process, the Navy also met the requirements of the Community Environmental Response Facilitation Act of 1992 (CERFA), which requires the identification of uncontaminated property at DOD installations that are being closed under BRAC. The EBS/CERFA report for NAS was completed in October 1994. The EBS report covered 76

Parcels including Zone 16 (containing the East Housing Area) built upon information presented in the EBS/CERFA report.

EBS sampling included collection of shallow soil gas samples at several locations across the site (see Figure 2-1). During the same interval, the Navy Public Works Corps, (PWC) collected several surface soil samples and had them analyzed for lead content. This work was performed in accordance with US Department of Housing and Urban Development guidelines. The locations of these surface samples are also shown in Figure 2-1.

In April and May 1999, Catellus Development Corporation (Catellus) performed additional investigation at the site in association with geotechnical evaluation of the site for future residential development. In conjunction with this investigation, Catellus collected numerous environmental samples in support of efforts to evaluate risks to human health associated with proposed residential reuse of the area. Twelve soil samples were collected from 1 to 2 feet bgs in the fill material, and analyzed for VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), and California Title 22 metals. Additionally, seven fill soil samples from 0.5 to 2.5 feet bgs and two samples from the Bay Mud at 4.5 feet bgs were collected and analyzed for the same constituents plus total purgeable and extractable hydrocarbons. The sample locations are shown in Figure 2-1.

A human health risk assessment (HHRA) was conducted during the remedial investigation for sites at the Alameda NAS that are affected by marsh crust (TtEMI, 1999). Consistent with USEPA and DTSC guidelines for conducting HHRA, the risk assessment found that there is no pathway to humans from the PAH in the marsh crust because of its depth. The HHRA determined that workers could be exposed to possible PAH contamination during construction of building foundations and utility work. However, DTSC has concluded that such exposures are unlikely to result in significant risk. The PAHs may pose an unacceptable risk to human health and the environment if excavated marsh crust materials are brought to the ground surface and handled in an uncontrolled manner (e.g., if contaminated marsh crust soil is placed at the surface as a result of construction activities, thus creating an exposure pathway).

Qualitative and quantitative ecological risk assessments conducted as part of the remedial investigation (PRC, 1996) found that there are no potential risks to terrestrial or aquatic receptors because the area has (1) limited and unsuitable habitat; (2) contaminants found in deep soils (marsh crust) have limited potential for exposure to terrestrial biota (deeper than most

animal burrows); and (3) PAH compounds are not highly soluble, and, based on fate and transport modeling, have a low probability for transport to adjacent surface waters.

2.3.2 *Surrounding Area Marsh Crust Investigation History*

Because the eastern portion of Alameda Point was constructed on top of the same tidal marshland as the FISCO Alameda, interpretation of the nature and extent of contamination of the marsh crust at the site is based on the data compiled and presented in the Final FS and FISCO Alameda RI reports. The OU-1 RI Report provided additional information regarding the location of the interface between fill materials and the underlying Bay Sediments at the NAS, Alameda Point. In particular, IR Site 7 of OU-1, located directly across Main Street from the site can be assumed to have very similar underlying geology as the East Housing Area due to their close proximity.

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FISCO-ALAMEDA

ARNOLD AVE.

14TH ST.

15TH ST.

371

361

362

363

MAIN STREET

TWELFTH ST.

DECATUR ST.

HOLLISTER CIR.

VERNALIS CIR.

SANTA ROSA CIR.

BAINBRIDGE AVE.

FALLON CR.

OCEANA CR.

S. P. R. R.

THIRD ST.

COTATI ST.

BRAINBRIDGE AVE.

ATLANTIC BOULEVARD

MAPLE WAY

171-0001
171-0002
171-0003M
171-0004M
171-0005M
171-0006M
171-0007M
171-0008M
171-009M
171-0010M
171-0011M
171-0012M
171-0013M
170-0001
170-0002
170-0003M
170-0004M
170-0005M
170-0006M
170-0007M
170-0008M
170-0009M
170-0010M
170-0011M
170-0012M
170-0013M
EH-1
EH-2
EH-3
EH-4
EH-5
EH-6
EH-7
EH-9
EH-10
EH-11
EH-12
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8

N

Legend:

- ● Soil Boring Location
- ◆ Soil Gas Location
- ▲ Surface Soil Sample Location

0 200
FEET

Figure 2-1

Site Plan with Historic Soil Sample Locations
Alameda Point - East Housing Area
Alameda, California

ERM 01/00

3.0 *RESULTS OF PREVIOUS INVESTIGATIONS*

This section describes the results of previous investigations at the site and surrounding areas.

3.1 *GEOLOGY*

The nature of surface and near-surface soil at the site has not been described during previous shallow lead and soil gas sampling events associated with the EBS program. However, soils at the site are expected to be similar to the adjacent FISCO Alameda and NAS soils that consist of artificial fill emplaced during the historical filling of the tidal marshlands and postfill construction activities during site development. The fill material is characterized by sands, clays, and silts dredged from the tidal flats in the region and mixed with material from the Merritt Sand Formation. The FISCO Alameda fill was found to be present to depths ranging from about 10 to 20 feet bgs, while the fill material at IR Site 7, Alameda Point, rarely exceeded 6 feet in depth, except in locations where former USTs had been excavated and backfilled to depths of approximately 10 feet bgs.

The marshland layer underneath the artificial fill material at the FISCO Alameda facility was observed during investigations as an organic-rich peat and grass layer that is about 2 to 6 inches thick at depths that range from approximately 10 to 20 feet bgs (PRC, 1996). This peat and grass layer was also recognized during previous geotechnical investigations and was also termed the marsh crust (Lee and Praszker, 1969). Immediately below the marsh crust layer is the Bay Mud layer, which underlies the fill material across the entire site, as shown in Figure 3-1. No distinct peat and grass layer was described at IR Site 7, but high concentrations of PAH near the fill/bay sediment interface indicate the presence if marsh crust constituents. The Bay Mud consists of recent sediments deposited in an estuarine environment. The Bay Mud generally consists of silt and gray to black clay with laterally discontinuous, poorly graded, silty and clayey sand layers. Based on soil borings completed at Alameda Point, the thickness of this unit generally ranges from less than 1 foot to 95 feet. IR Site 7 soil boring logs identified the thickness of the Bay Mud at approximately 35 to 45 feet bgs. Soil boring logs created during the ERM May 1999 soil sampling event at the site indicated a brown to gray silty clay layer in most borings from approximately 2 to 4 feet bgs, overlain

with fill materials. No marsh crust layer was detected above this clay during this event.

The Merritt Sand Formation, which underlies the Bay Mud over most of Alameda, contains the first principal aquifer. The unit is believed to be eolian in origin and was deposited during the late Pleistocene and Holocene epochs. The unit ranges from 60 to 90 feet in thickness under Alameda Point and consists of yellow-brown to dark yellowish-orange, well-sorted, fine-grained sand and silty or clayey sand. The Merritt Sand Formation was found to extend to a depth of approximately 55 feet bgs in multiple deep borings at IR Site 7. Figure 3-1 is a generalized geologic cross-section of tidal channels beneath the site, as developed by the Navy for the Final FS report. The fourth geologic unit within Alameda Point is the Upper San Antonio Formation, which underlies the Merritt Sand Formation and is characterized by alluvial deposits of grayish-olive silty sand intermixed with very fine to medium sand and silt.

3.2 *GENERAL HYDROLOGIC CONDITIONS*

Fill material above the Bay Mud Formation constitutes the shallow, unconfined water-bearing zone beneath FISCO Alameda and NAS Alameda. This shallow water-bearing zone is not considered to be a regionally extensive aquifer. The depth to shallow ground water in the artificial fill at FISCO Alameda varied between approximately 2 and 12 feet bgs, based on water levels measured during the monitoring program from June 1994 to December 1996, and between 1.5 and 8 feet bgs at IR Site 7. In general, shallow ground water is found at about 6 feet bgs at FISCO Alameda and approximately 4 feet bgs at IR Site 7. The Bay Mud forms an aquitard between the shallow ground water and the Merritt Sand that composes much of the deeper confined aquifer beneath the facility (PRC, 1996). The ground water flow in the deeper aquifer was determined to be to the west-southwest in August 1992 and to the northeast in January 1993 (PRC, 1993). The shift in flow in the deeper confined aquifer is concluded to be the result of tidal influence. Regional ground water in the shallow aquifer below FISCO Alameda flows to the northwest, toward the Oakland Inner Harbor. This means that the ground water generally flows off site into the Oakland Inner Harbor. Regional flow of the shallow aquifer beneath IR Site 7 is to the east, although this flow direction is likely influenced by preferential flow paths caused by storm and sanitary sewer lines as well as leaks in those lines. Aquifer tests indicate that the Bay Mud aquitard acts as an effective hydraulic barrier between the confined aquifer and the unconfined water-bearing zone.

Over most of Alameda Point, the shallow ground water is referred to as the first water bearing zone (FWBZ). Ground water flow in the FWBZ is primarily horizontal and generally flows radially from the central portion of Alameda Point toward San Francisco Bay, the Oakland Inner Harbor, and the Seaplane Lagoon. In the southeastern region of Alameda Point, ground water in the FWBZ generally flows from the east or northeast inland areas to the west or southwest toward the Seaplane Lagoon and San Francisco Bay. At FISCO Alameda, ground water elevation data from monitoring wells indicate a north-northwest flow direction. Hydraulic head fluctuations of approximately 1 foot were observed in some FISCO Alameda wells, suggesting that the shallow water-bearing zone may be in hydraulic communication with the Oakland Inner Harbor.

3.3 *SOIL AND GROUND WATER CHEMISTRY INVESTIGATION*

The following are the results of sampling data applicable to the site and surrounding areas.

3.3.1 *Site Soil Data*

Analytical results for lead in soil samples from EBS parcels 170 and 171 are summarized in the *Lead Management Plan* (Department of the Navy, PWC, 1996). Lead results from the site indicate that seven of 32 samples collected exceeded the Cal/EPA residential PRG of 130 mg/kg, with one sample at 409 mg/kg, exceeding the USEPA residential PRG for lead. However, based on the distribution of lead concentrations and the fact that sampling was biased towards areas of concern (e.g., drip lines and foundations), it was concluded that the parcels are safe for the intended reuse. The findings were outlined in the *Final Sector Finding of Suitability to Lease Zones 6, 13, 14 (partial), 17, 19, and 22 NAS Alameda* (PRC, 1996).

Results of soil gas samples collected for the EBS at depths of 2.5 to 3 feet from 14 on-site locations indicated only one concentration of o-xylenes (3 mg/cubic meter in sample 170-0003M) above applicable PRGs. Ten soil samples collected from the ground surface to 3.5 feet at 10 locations throughout the site showed only a few trace concentrations of pesticides and the VOC acetone, all well below applicable PRGs.

Soil sampling data from Catellus' April-May 1999 investigation have not yet been published. However, a preliminary evaluation of risks represented by the subject data has been completed and found that the primary risk drivers for the site are PAHs, and that all estimated

carcinogenic risks and noncancer hazard indices associated with PAHs at the site are considered within the risk management range for unrestricted residential use under USEPA guidelines.

3.3.2 *Soil and Ground Water Data for Surrounding Sites*

The Navy began investigating sites at FISCO Alameda under the IR beginning in the 1980s. Eight IR sites were identified at FISCO Alameda as a result of preliminary assessment/site inspection (PA/SI) activities under CERCLA and a Resource Conservation and Recovery Act (RCRA) facility assessment (PRC, 1996, DTSC, 1993). A Federal Facility Site Remediation Agreement between the Navy and the State of California was signed in 1992 for subsequent RI/FS and response actions.

Several previous investigations have been conducted at various areas within FISCO Alameda in which samples were collected from shallow soil (soil from the surface to 10 feet bgs), deep soil (soil from 10 feet to 22.5 feet bgs), and shallow and deep ground water. During the FISCO Alameda RI, each of the IR sites was further investigated except for IR Site 1, the Warehouse Area adjacent to the northern boundary of the site, because the PA/SI report concluded that no further investigation was necessary in this area due to the low concentrations of metals in soils. After the evaluation of sampling results, chemicals of potential concern (COPCs) within the shallow and deep soil and the shallow ground water were selected for evaluation in an HHRA, as described in Chapter 7 of the FISCO Alameda RI report. The report concluded that chemicals detected sporadically and at low concentrations in deep ground water were not considered COPCs.

During the FISCO Alameda RI, analytical data were collected on the marsh crust in and around IR Site 2. Analytical results for soil indicated high concentrations of PAHs and total petroleum hydrocarbons (TPH). PAHs are common components of TPH and were the specific components identified in the HHRA as posing potential human health risks. Because of the site's history, geology, and previous investigations, all marsh crust underlying FISCO Alameda is assumed to contain PAHs in roughly similar concentrations to those found at IR Site 2.

The extent of the marsh crust was determined in two ways: (1) review of boring logs prepared during installation of monitoring wells or borings at all of the FISCO Alameda IR sites to determine the depth of the transition from fill to the Bay Mud and (2) examination of soil analytical data at IR Site 2 to determine chemical characteristics of the marsh crust and the depth and location of samples with higher SVOC concentrations. The

mean depth of the marsh crust at FISCO Alameda was found to be 15.3 feet bgs. Based on available lithologic data, the marsh crust appears to be present as a thin layer between 10 to 20 feet bgs. The marsh crust geometry is expected to be complex within FISCO Alameda because of the large number of tidal channels dissecting the surface of the tidal marshland, as shown in Figure 3-1.

COPCs established in the FISCO Alameda RI for deep soils and shallow ground water were grouped into five categories: SVOCs, PCBs, TPH, metals, and VOCs. Results indicate that SVOCs, TPH, and metals are widely distributed in shallow ground water. PCBs were found mostly in surface soil and only at IR Site 2. IR Site 2 is the Screening Lot/Scrapyard area that is approximately 700 feet north of the northeastern site boundary. Two removal actions were completed at IR Site 2 for soil contaminated with PCBs and lead. Two removal actions were completed for contaminated sediment and debris from the storm water drainage system at FISCO Alameda, including IR Site 1 and IR Site 2. A summary of these removal actions can be found in the Final FS report. Aromatic VOCs, PAHs, and TPH compounds were also detected in shallow ground water at IR Site 2 during the RI, but the plume appears to be limited in lateral extent, and ground water modeling determined that this plume does not present an environmental risk.

Several phases of investigation have been conducted at the 25 IR sites at Alameda Point for soil, sediment, and ground water media. Due to the large number of investigations and IR sites, a basewide RI report has not been prepared for Alameda Point. Instead, four OUs were developed to streamline the investigative and reporting process. To date, RI reports for OU-1 and OU-3 (TtEMI, 1999a and 1999b) have been prepared, with the RI report for OU-2 currently in production.

The OU-1 RI report describes remedial investigations at five light industrial sites within Alameda Point, including IR Site 7, located directly across Main Street from the site. Surface and subsurface soil samples were collected during the Phase 2B and 3 investigations (PRC, 1992) and follow-up investigations (PRC, 1995). During the Phase 2B and 3 investigations, surface samples were analyzed for SVOCs, pesticides/PCBs, total metals, total recoverable petroleum hydrocarbons, pH, and percent moisture. Subsurface soil samples were analyzed for these constituents plus VOCs and total organic carbon (TOC). Soil samples collected during the follow-on investigation were analyzed for VOCs, total metals, TPH-(extractable and purgeable ranges), TOC, pH, and percent moisture. The HHRA associated with the RI determined that total Reasonable Maximum

Exposure risk for residential receptors at IR Site 7 exceeded $1X10^{-4}$ due mainly to benzene in the soil, but that no appreciable health risk was posed by SVOC concentrations within these soils. In the HHRA for OU-1, soil data for each site were aggregated in depth intervals of zero to two feet bgs and zero to 10 feet bgs or depth to groundwater if groundwater was less than 10 feet bgs. Because of this, high PAH concentrations at 6.5 to 8 feet bgs were excluded from the HHRA at IR Site 7.

Ground water investigation activities at Alameda Point included monitoring well installation, ground water sampling, and HydroPunch sampling. Twelve monitoring wells at IR Site 7 were established in addition to the three wells (W-1, W-2, and W-3) installed during previous investigations. Ground water samples were collected from 16 HydroPunch locations. During the follow-up investigations, ground water sampling occurred quarterly over the following intervals: 14 November to 20 December 1994; 9 to 14 February 1995; 14 to 16 1995; and 22 August to 19 December 1995. Based on ground water sampling results the HHRA determined that Reasonable Maximum Exposure risks associated with ground water exceeded $1X10^{-4}$ for lifetime cancer risk and a Hazard Index of 1.0, due primarily to risks associated with arsenic. No health risks associated with elevated concentrations of SVOCs in ground water were identified.

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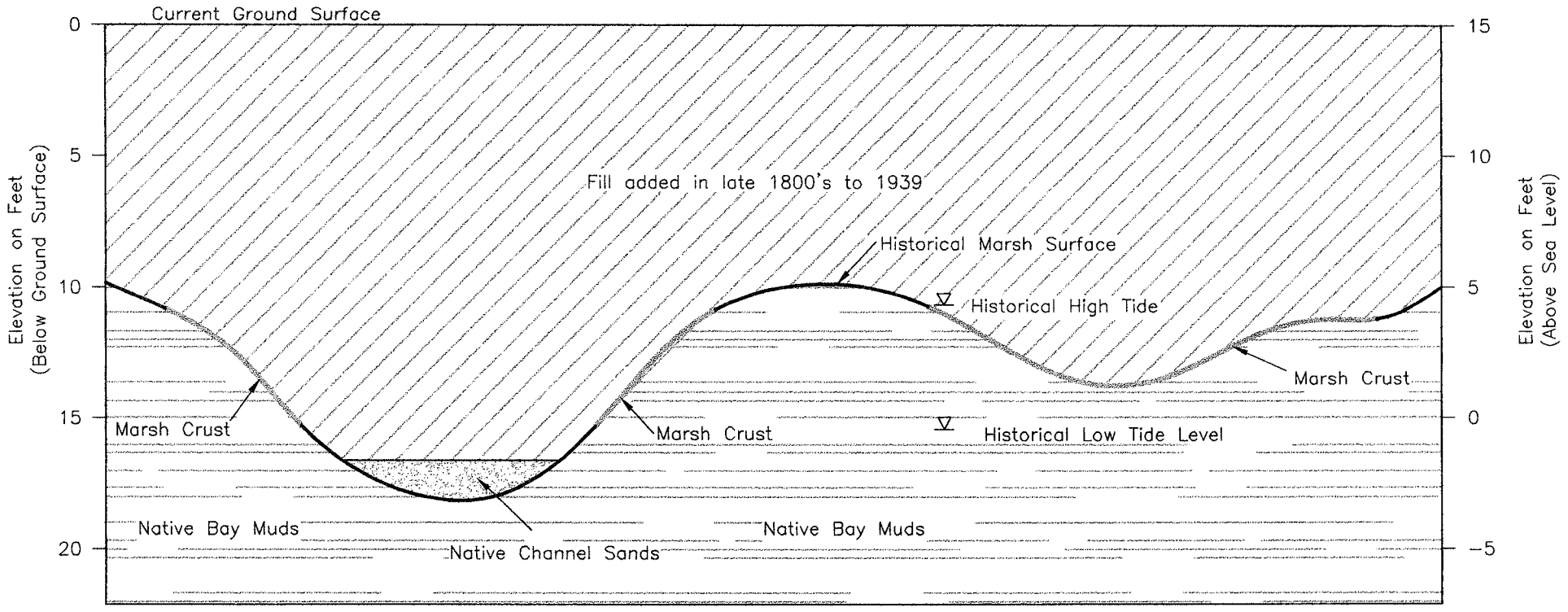

Note: Map is based on boring logs and historical records.

Reference: Draft Final Feasibility Study for the Marsh Crust and Groundwater at the Fleet Industrial Supply Center Oakland Alameda Facility/Alameda Annex and Feasibilty Study for the Marsh Crust and Former Subtidal Area at Alameda Point, by Tetra Tech Environmental Management Inc., 6 January 2000.

Figure 3-1

Generalized Geologic Cross-section of Tidal Channels
Alameda Point - East Housing Area
Alameda, California

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4.0 *EFFECTS FROM EXPOSURE TO CONSTITUENTS IN THE MARSH CRUST*

This section briefly addresses the conditions under which exposure to constituents found within the marsh crust could occur at the site and describes the principal health effects associated with those compounds. The primary chemicals of concern are PAHs, a class of chemicals found naturally in petroleum products, including gasoline, diesel, and certain mineral spirits, and also as by-products of coal or oil gasification. PAHs tend to adhere to soil particles and are effectively immobile. Ground water data from known marsh crust areas contain PAH contaminants, but the concentrations are very low relative to concentrations in the marsh crust (e.g., 2.6 parts per million, naphthalene in ground water versus 1,900 parts per million naphthalene in the marsh crust). This phenomenon indicates that ground water is not an effective transport mechanism for the PAHs in the marsh crust.

PAHs are found throughout the environment in the air, water, and soil (Agency for Toxic Substances Disease Registry [ATSDR], 1993). Of the more than 100 distinct PAH compounds identified, the following 10 compounds have been identified as constituents of concern in the marsh crust: benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo[a,h]anthracene, ideno[1,2,3-cd]pyrene, pyrene, fluoranthene, and phenanthrene (PRC, 1996). Of these 10, only the first seven have demonstrated carcinogenic potential in animal or human studies, and are thus considered the primary COCs for the purposes of this document. Although considered to be noncarcinogenic, the remaining three PAHs are COCs due to their potential to cause adverse systemic, reproductive, and developmental health effects.

Due to their similarity in chemical properties, mechanisms of toxicity, and human health effects, the 10 PAHs identified above will be treated as a single group within this document, with the exception of the discussion of carcinogenicity, which applies primarily to the seven compounds that have demonstrated carcinogenic potential. Available research suggests that the carcinogenic PAHs exert their effects by a common mechanism: metabolism of the parent compound to reactive metabolites that then bind to DNA, RNA, or cell proteins, thereby altering normal cellular functions. Although the potential toxicity of these PAHs generally derive from their carcinogenic potential, additional human and animal studies suggest that

adverse systemic, reproductive and developmental effects can possibly occur from acute oral and dermal exposures to both classes of PAHs.

4.1 *POTENTIAL EXPOSURE*

As discussed above, the marsh crust is a thin, subsurface layer between the Bay Mud and the overlying fill material. While the average depth of the marsh crust within the East Housing Area site alone has not been calculated, the average depth within Alameda Point as a whole is approximately 8 feet, with a range of 4 to 10 feet. Based on the proximity of the East Housing Area to the former shoreline (prior to filling of the island), it is anticipated that the approximate depth to marsh crust (if it is present) in this area would be generally consistent with that estimated for the remainder of Alameda Point (i.e., about 8 feet bgs). PAH concentrations in the marsh crust are high enough to cause concern about long-term exposure that might occur should marsh crust sediments be excavated and left at the surface, but incidental exposure through light construction or landscaping activities is not expected to result in a dose that would result in an unacceptable risk.

Given these conditions and anticipated future activities at the site, all exposure pathways are incomplete with the exception of those associated with intrusive subsurface activities or excavation of the marsh crust boundary. Potential exposure routes related to such activities include incidental ingestion, inhalation of fugitive dust, and dermal contact.

4.2 *TOXICITY*

This section provides general information regarding acute, subchronic and chronic, and carcinogenic toxicity of PAH compounds. It also discusses the various carcinogenic classifications of PAHs.

4.2.1 *Acute Toxicity*

Because most of the information concerning PAHs deals with their carcinogenic risk and overt signs of acute toxicity only occur at doses considerably larger than those producing tumors, very little information exists regarding acute toxicity of PAHs at low concentrations (i.e., environmental levels). No adverse effects following acute exposure have been recorded in humans. Investigations with mice have shown increased photosensitivity (Forbes et al., 1976) and allergic contact hypersensitivity

(Klemme et al., 1987) following acute dermal applications of PAHs, although photosensitivity followed application of anthracene, a PAH not detected in the marsh crust in concentrations above data management benchmarks (DMBs). No animal data have been found regarding adverse effects following oral or inhalation exposure to PAHs.

4.2.2 *Subchronic and Chronic Toxicity*

Subchronic and chronic toxicity to PAHs are generally seen in rapidly proliferating tissues or organs, such as bone marrow, skin, and reproductive cells, and have been attributed to the metabolism of the parent compound to reactive metabolites. Human data are relatively limited and include:

- Reports of melanosis of the colon and rectum following prolonged consumption of anthracene-containing laxatives (Badiali et al., 1985). Again, anthracene is a PAH not detected in the marsh crust in concentrations above its DMB; and
- Development of benign warts following subchronic dermal application of benzo(a)pyrene (Cottini and Mazzone, 1939).

PAHs have been shown to be toxic to the hematopoietic and lymphoid systems in experimental animals. In mice, oral exposure to PAHs has resulted in decreased bone marrow production of blood products causing death due to hemorrhage or infection (Robinson et al., 1975). Oral exposure has also resulted in changes in gonadal morphology and reductions in mean pup weight and offspring fertility in mice (Mackenzie and Angevine, 1981), and in increased liver weight (Gershbein, 1975) and fertility reduction of exposed female rats (Rigdon and Rennels, 1964). Recorded results of dermal exposure to PAHs in mice include sebaceous gland suppression (Bock and Mund, 1958), hyperplasia (Albert et al., 1991), and immunosuppression (Andrews et al., 1991). No data were found regarding inhalation exposure resulting in subchronic or chronic PAH toxicity.

4.2.3 *Carcinogenicity*

Evidence exists to indicate that certain mixtures of PAHs are carcinogenic in humans. This evidence comes primarily from occupational studies of workers exposed to mixtures containing PAHs as a result of involvement in such processes as coke production, roofing, oil refining, or coal gasification. PAHs, however, have not been clearly identified as the causative agent. Cancer in humans associated with exposure to PAH-

containing mixtures occurs predominantly in the lung and skin following inhalation and dermal exposure, respectively. Oral exposure to PAHs in rats has resulted in forestomach, esophageal, and laryngeal tumors (Brune et al., 1981). A dose-response carcinogenic relationship has been noted for respiratory tract tumors in hamsters following inhalation exposure to PAHs (Thyssen et al., 1981) and for skin papillomas and carcinomas in mice following dermal exposure (Wydner and Hoffman, 1959; Albert et al., 1991; Van Duuren et al., 1967).

4.2.4 *Carcinogenic Classification*

Based on data from animal studies, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, and ideno[1,2,3-cd]pyrene are classified as B2, or probable human carcinogens, according to the USEPA's proposed guidelines for carcinogenicity. This classification indicates that there are sufficient data from animal studies to determine that the compounds can be carcinogenic to some organisms. However, the data are inadequate to confirm that the compounds are carcinogenic in humans (USEPA, 1989, *Risk Assessment Guidance for Superfund*, Volume 1: Human Health Evaluation Manual, EPA/540/1-89/002). The remaining three PAHs addressed in this document, pyrene, fluoranthene, and phenanthrene, are classified by the USEPA as Class D, or not classifiable as to human carcinogenicity based on no human data and insufficient data from animal research (USEPA, 1999/2000).

5.0 *REMEDIAL ACTION OBJECTIVES*

This section identifies RAOs developed for medium-specific and/or area-specific protection of human health at the site. Chemical-, action-, and location-specific ARARs and To-Be-Considered (TBC) criteria for the site are also addressed.

5.1 *REMEDIAL ACTION OBJECTIVES*

HHRAs conducted as part of the RIs at FISCO Alameda and Alameda Point indicate (1) no exposure pathway exists when the marsh crust is left undisturbed in the subsurface, and (2) long-term exposure to marsh crust contaminants could result in an unacceptable risk. Therefore, the purpose of the proposed remedy is to maintain the circumstances of no significant exposure.

RAOs are either medium-specific or OU-specific goals for protecting human health. Where possible, each RAO should specify (1) each contaminant of concern; (2) the exposure route and each receptor; and (3) an acceptable contaminant concentration or range of concentrations for each exposure pathway and medium. No risks outside the risk management range were identified in the RI. This RAW is being prepared to address concerns about the possibility that future construction could bring contaminated material from the marsh crust to the surface where site users could be exposed.

RAOs developed for protecting human health typically address both chemical concentrations and potential exposure routes. Protection can be achieved by either reducing concentrations and/or reducing or eliminating potential exposure pathways.

This RAW's recommended RAO for human health is to prevent human exposure to PAHs by restricting excavation into the marsh crust unless proper H&S and disposal procedures are followed.

Current conditions at the site satisfy the RAO to a significant degree. The marsh crust, if present, is estimated to be approximately 8 feet bgs, which has effectively prevented human exposure to PAHs to date.

The following is a discussion of ARARs for the site. This discussion is based on technical analysis of site conditions and does not represent a legal opinion.

5.2 *APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS*

The Federal Superfund Amendments and Reauthorization Act of 1986 (SARA; Title 42 of the United States Code [USC] Part 11001 et seq.) and its implementing regulations (Title 40 of the Code of Federal Regulations [CFR] Part 300) require consideration of ARARs. Applicable requirements are promulgated federal or state standards that specifically address a hazardous constituent, remedial action, location, or other circumstance at a hazardous waste site. A requirement is applicable when its scope and authority are intended to cover the remedial actions and circumstances at a site (40 CFR 300.400[g][1]). Relevant and appropriate requirements are promulgated federal or state requirements that, while not directly applicable to the circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at a hazardous waste site, and that are well-suited to the site. (40 CFR 300.400[g][2]).

Section 121 of CERCLA requires that the selected remedy meet ARARs unless a waiver is justified. USEPA has identified three classifications of ARARs: chemical-specific, location-specific, and action-specific (Office of Solid Waste and Emergency Response [OSWER] Directive 9234.101, 1988). During the RI, federal regulatory statutes were evaluated to identify potential federal ARARs. In accordance with the NCP (40 CFR 300.515[h][2]), the Navy solicited the Cal/EPA for the identification of potential state chemical- and location-specific ARARs for Alameda Point (U.S. Navy 1994, 1995, 1996) which encompasses the site. On 13 November 1996, Cal/EPA responded by letter with a general list of laws it considers as ARARs.

5.2.1 *Chemical-Specific ARARs*

Chemical-specific ARARs are health- or risk-based numerical standards that, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in or discharged to the ambient environment to protect against unacceptable risks to human health and the environment.

Potential federal and state ARARs have been reviewed and it was determined that there are no federal or state chemical-specific ARARs.

5.2.2 *Location-Specific ARARs*

Location-specific ARARs are restrictions placed on the concentrations of hazardous substances or on the conduct of activities due to the characteristics of the site or its immediate environment. For example, the location of a site or proposed remedial action in a flood plain, wetland, historic place, or sensitive ecosystem may trigger location-specific ARARs. Any remedial action that would affect a site must comply with these requirements. Potential federal and state ARARs have been reviewed and the following location-specific ARARs pertaining to remedial alternatives for the marsh crust have been identified.

- The Coastal Zone Management Act (16 USC 1451) defines activities that affect land or water use in coastal zones, and Section 1456(c) specifies that federal activities that may affect the coastal zone must be consistent, to the maximum extent practicable, with approved state management programs. Within the San Francisco Bay Area, the local coastal zone management program is described in the San Francisco Bay Conservation and Development Commission Bay Plan, enacted pursuant to the McAteer-Petris Act of 1965. These requirements are cited in Table 5-1.

- Substantive requirements of the California Department of Fish and Game Code (CFG 5650) are included as ARARs, because fish and birds use the Oakland Inner Harbor. This requirement is cited in Table 5-1.

5.2.3 *Action-Specific ARARs*

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes or substances. These requirements are triggered by the particular remedial activities selected. Action-specific ARARs are discussed in conjunction with the specific remedial alternatives to be analyzed.

5.2.4.1 *Remedial Alternative 1 – No Action*

No remedial action would be taken under Alternative 1. The physical condition of the marsh crust would remain unchanged. No institutional controls, containment, removal, or treatment would be implemented, and no other mitigating actions would be taken. Alternative 1 is retained

throughout the RAW process, as required by the NCP, to provide a comparative baseline against which other alternatives can be evaluated.

There is currently no risk to human health from the marsh crust at the site because there is no exposure pathway. The marsh crust at the site is also inaccessible to future residents; although it is accessible to construction workers, the risk is acceptable as stated in the draft OU-1 and OU-3 RI reports (TtEMI 1999a, TtEMI 1999b), and the pending OU-2 RI report. It is, however, assumed that future construction could result in the marsh crust being brought to the surface, where it could become a source of exposure to future occupants. For purposes of this RAW, it is assumed that the marsh crust at the surface could pose a threat to future residents. Because of this concern, the alternative, no remedial action, may not be protective of human health.

No action-specific ARARs apply to Alternative 1.

5.2.4.2 *Remedial Alternative 2 – Institutional Controls*

This alternative involves the City of Alameda entering into a land-use covenant with DTSC and enacting the Marsh Crust Ordinance. No active engineering or construction would be required. The institutional controls would restrict excavation in the marsh crust unless proper H&S and disposal procedures are followed. The institutional controls are ultimately enforceable by the DTSC. The institutional controls would be directly implemented by the City of Alameda pursuant to the Marsh Crust Ordinance, as long as the ordinance remains consistent with this document and the land-use covenant.

There is currently no unacceptable risk to human health from the site; however, future excavation activities could bring material to the surface and expose future occupants. The institutional controls would regulate uncontrolled disposal of marsh crust and facilitate an enforcement mechanism through DTSC, to be directly implemented by the City of Alameda pursuant to the Marsh Crust Ordinance. Human health would be protected by requiring that excavated soil be handled and disposed of to prevent exposure.

Since institutional controls would reduce the already low likelihood of exposure to the marsh crust, Alternative 2 is protective of human health.

No action-specific ARARs apply to Alternative 2.

5.2.4.3 *Remedial Alternative 3 – Excavation and Off-Site Disposal*

Although site risks are currently acceptable, Alternative 3 would involve excavation and off-site disposal of marsh crust at a Class I or II landfill. This alternative is described in further detail in Section 6.4.

The location-specific ARARs introduced in Section 5.2.2 apply to Alternative 3. The site is not located in the coastal zone, but excavation and disposal activities would be conducted to the maximum extent practicable, in accordance with the San Francisco Bay Plan (revised June 1998) because these activities may affect resources of the coastal zone at adjacent facilities. In addition, since birds and fish use the Oakland Inner Harbor, CFG 5650 has been identified as relevant and appropriate to Alternative 3. Excavation would be conducted in a manner to prevent disposition into the Inner Harbor of contaminated material that could be deleterious to birds or fish. These location-specific ARARs are listed in Table 5-1.

Excavation and disposal activities potentially trigger a variety of hazardous waste requirements under the California Hazardous Waste Control Law (Ca-HSC 25100 and following sections). These requirements determine how excavated marsh crust and overburden must be managed. Samples would be collected from excavated soil and analyzed in accordance with hazardous waste identification regulations in Title 22 of the California Code of Regulations (CCR), Sections 66261.10 - 66261.24, to determine whether soils and ground water exhibit state or federal hazardous waste characteristics. The former marsh crust soil and other media that qualify as hazardous waste would be managed in accordance with generator requirements, 22 CCR Section 66262.34. Soils that must be managed as hazardous waste would be stockpiled within the area of contamination so that minimum technology requirements and land disposal restrictions are not triggered. As appropriate, extracted overburden would be evaluated in accordance with 22 CCR 66268.7(a) to determine whether it is subject to land disposal restrictions.

Several Bay Area Air Quality Management District (BAAQMD) regulations are potential ARARs for excavation activities. First, substantive requirements in BAAQMD Regulation 6 and Regulation 8 are ARARs for excavation activities. Specifically, Regulations 6-6-301, 6-6-302, and 6-6-305, which contain particulate and visible emissions standards, are applicable to limit emissions of dust and particulates during excavation and removal of soils. Appropriate actions, such as water spraying, to control dust emissions during excavation and transport

would be taken. Regulation 8-40-301, which limits uncontrolled aeration, and Regulation 8-40-303, which contains requirements for soil storage piles, are also ARARs for stockpiling of soil.

If the soil must be managed as hazardous waste, the precipitation and drainage requirements for stockpiling of soil in 23 CCR 2546, are relevant and appropriate to Alternative 3. These action-specific ARARs are listed in Table 5-2.

Off-site transportation and disposal requirements are not ARARs. However, all substantive and administrative requirements associated with these activities would be followed.

5.2.4.4 *Remedial Alternative 4 – Excavation and On-Site Treatment with Thermal Desorption*

Alternative 4 consists of excavation of the marsh crust, on-site treatment of soil using the thermal desorption, and backfilling and restoration of excavation areas with treated soil. This alternative is described in further detail in Section 6.5.

As described in Alternative 3, all hazardous waste ARARs identified for excavation and handling of contaminated media will be followed for this alternative. In addition, the substantive performance standards for miscellaneous RCRA units in 22 CCR 66264.601 are relevant and appropriate to operation of the thermal desorption unit. If the marsh crust materials must be managed as hazardous waste, BAAQMD Regulation 2-2-301, which requires use of best available control technologies for new sources, may also be relevant and appropriate to the treatment of the marsh crust by thermal desorption because nitrogen oxides (NO_x), VOCs, SVOCs, or other ozone precursors could be emitted in sufficient quantities for the facility to be considered a new source under BAAQMD rules. These action-specific ARARs are listed in Table 5-2, along with those previously identified for Alternative 3.

5.3 *TO-BE-CONSIDERED CRITERIA*

In addition to ARARs, TBC criteria include policies, advisories, or guidance issued by federal, state or local government. Variances may be incorporated where there are specific circumstances where compliance with a requirement may be inappropriate for technical reasons or

unnecessary to protect human health and the environment (55 Federal Register [FR] 8741-8744, 8 March 1990).

To oversee and regulate investigations and cleanup and abatement activities, the Regional Water Quality Control Board (RWQCB) may refer to the California Wetlands Conservation Policy (Executive Order W-59-93); USEPA's Clean Water Act 404(b)(1) *Guidelines for Specification of Disposal Sites for Dredge or Fill Materials*; and California State Water Resources Control Board (SWRCB) Resolution No. 92-49, *Policies and Procedures for Investigation, Cleanup, and Abatement of Discharges Under Water Code, Section 13304*.

Table 5-1 Potential Location-Specific Applicable or Relevant and Appropriate Requirements — Alameda Point East Housing Area

Citation	ARAR Classification	Description	Comments
Federal Location-Specific ARARs			
Coastal Zone Management Act 16 USC 1456(c)(1)(A); 15 CFR 930	Relevant and appropriate	Requires federal agencies to conduct activities affecting the coastal zone consistent to the maximum extent practicable with approved state management programs.	Alameda Facility/Alameda Annex and Alameda Point are not located within the coastal zone, but active remedial activities at the facility may affect land or water use, or natural resources of the coastal zone at adjacent facilities.
State Location-Specific ARARs			
McAteer-Petris Act (California Government Code Section 66600 and following sections)	Relevant and appropriate	The state management program for San Francisco Bay is contained in the Bay Conservation and Development Commission Bay Plan, enacted pursuant to the McAteer-Petris Act of 1965. It establishes requirements for prescribed activities affecting San Francisco Bay.	Alameda Facility/Alameda Annex and Alameda Point are not located within the coastal zone but active remedial activities at the facility may affect land or water use, or natural resources of the coastal zone at adjacent facilities.
California Water Pollution Prohibition Act (California Fish and Game Code [CFG] Section 5650)	Relevant and appropriate	Prohibits the deposition, directly or indirectly, into waters of the state of any substance or material that is deleterious to fish, plant, or bird life	Relevant to protect fish, plants or birds that may use the Oakland Inner Harbor from contamination resulting from excavation and treatment activities.

Notes:

ARAR	Applicable or relevant and appropriate requirement
CFR	Code of Federal Regulations
USC	U.S. Code
CFG	California Department of Fish and Game Code

Table 5-2 *Potential Action-Specific Applicable or Relevant and Appropriate Requirements for Marsh Crust — Alameda Point East Housing Area*

Citation	ARAR Classification	Description	Comments
Alternative 1 – No Action			
Federal Action-Specific ARARs – None			
State Action-Specific ARARs – None			
Alternative 2 – Institutional Controls			
Federal Action-Specific ARARs – None			
State Action-Specific ARARs – None			
Alternative 3 – Excavation and Off-Site Disposal			
Federal Action-Specific ARARs *			
22 CCR Sections 66261.10 and 66261.24(a)(1)	Applicable	Establishes criteria for identifying hazardous waste.	These requirements will apply to characterize excavated soil to determine whether it must be managed as hazardous waste.
22 CCR Sections 66262.1, 66262.11, 66262.20, 66262.30, 66262.31, 66262.32, 66262.33, and 66262.34	Applicable	Establishes standards for generators of hazardous waste.	If excavated soil is hazardous waste, these requirements will apply to managing excavated soil prior to shipment off site.

Table 5-2 (Continued) Potential Action- Specific Applicable Or Relevant And Appropriate Requirements For Marsh Crust — Alameda Point East Housing Area

Citation	ARAR Classification	Description	Comments
22 CCR Section 66268.7(a)	Applicable	Sets requirements for testing excavated soil to see if it is restricted for land disposal.	This regulation requires generators to determine if treatment is required prior to land disposal. It will be ensured that necessary analyses are conducted.
State Action-Specific ARARs			
22 CCR Section 66261.24(a)(2)	Applicable	Establishes criteria for identifying California hazardous waste.	This requirement applies to characterize excavated soil to determine if it is California hazardous waste.
BAAQMD Regulation 6-301, 302, and 305	Relevant and appropriate	Sets requirements for controlling particulate and visible emissions during excavation and transport.	These requirements may be applicable to excavation and handling of soils.
BAAQMD Regulation 8-40-301 and 8-40-303	Applicable	Limits uncontrolled aeration of stockpiled soil.	These requirements are applicable to contaminated soils, which are excavated and stockpiled.
23 CCR 2546	Relevant and appropriate	Requires precipitation and drainage controls to limit to the greatest extent possible, inundation, erosion, or other conditions affecting stockpiled soils.	These requirements are relevant and appropriate to stockpiles generated from excavation of soil if the soil must be managed as a hazardous waste.

Table 5-2 (Continued) Potential Action- Specific Applicable Or Relevant And Appropriate Requirements For Marsh Crust — Alameda Point East Housing Area

Citation	ARAR Classification	Description	Comments
Alternative 4 – Excavation and On-Site Thermal Desorption			
Federal Action-Specific ARARs *			
22 CCR Sections 66261.10 and 66261.24(a)(1)	Applicable	Establishes criteria for identifying hazardous waste.	These requirements will apply to characterize excavated soil and treatment residuals to determine whether materials must be managed as hazardous waste.
22 CCR Sections 66262.1, 66262.11, 66262.20, 66262.30, 66262.31, 66262.32, 66262.33, and 66262.34	Applicable	Establishes standards for generators of hazardous waste.	If excavated soil is hazardous waste, these requirements will apply to managing excavated soil prior to shipment off site.
22 CCR Section 66268.7(a)	Applicable	Sets requirements for testing excavated soil to see if it is restricted for land disposal.	This regulation requires generators to determine if treatment is required prior to land disposal.
22 CCR Section 66264.601	Relevant and appropriate	Sets requirements for treatment of hazardous waste in miscellaneous units.	These requirements are relevant and appropriate to operation of a thermal desorption process for treatment of the former subtidal area and the marsh crust if the soil must be managed as a hazardous waste.

* State regulations that are part of a federally authorized or delegated state program are generally considered federal ARARs (55 Federal Register [FR] 8742).

Table 5-2 (Continued) Potential Action- Specific Applicable Or Relevant And Appropriate Requirements For Marsh Crust —Alameda Point East Housing Area

Citation	ARAR Classification	Description	Comments
State Action-Specific ARARs			
22 CCR Section 66261.24(a)(2)	Applicable	Establishes criteria for identifying California hazardous waste.	This requirement applies to characterize excavated soil to determine whether it is California hazardous waste.
BAAQMD Regulation 6-301, 302, and 305	Relevant and appropriate	Sets requirements for controlling particulate and visible emissions during excavation and transport.	These requirements may be applicable to excavation and handling of soil.
BAAQMD Regulation 8-47	Relevant and appropriate	Establishes emission standards for active treatment systems that treat organic compounds in soil.	These requirements may be relevant and appropriate to operation of the thermal desorption unit.
BAAQMD Regulation 8-40-301 and 8-40-303	Applicable	Limits uncontrolled aeration of stockpiled soil.	These requirements are applicable to contaminated soil that is excavated and stockpiled.

Table 5-2 (Continued) Potential Action- Specific Applicable Or Relevant And Appropriate Requirements For Marsh Crust – Alameda Point East Housing Area

Citation	ARAR Classification	Description	Comments
23 CCR 2546	Relevant and appropriate	Requires precipitation and drainage controls to limit to the greatest extent possible, inundation, erosion, or other conditions affecting stockpiled soil.	These requirements are relevant and appropriate to stockpiles generated from excavation of soil if the soil must be managed as a hazardous waste.
Use of BACT for new sources (BAAQMD Regulation 2-2-301)	Relevant and appropriate	Sets substantive requirements for use of BACT if treatment technology is a new source of precursor organic compounds or NO_x.	Relevant and appropriate if the thermal desorption process emits VOCs, SVOCs, or NO_x and qualifies as a new source.

* State regulations that are part of a federally authorized or delegated state program are generally considered to be federal ARARs (55 FR 8742).

Notes:

ARAR	Applicable or relevant and appropriate requirement
BAAQMD	Bay Area Air Quality Management District
BACT	Best available control technology
CCR	California Code of Regulations
NO_x	Nitrogen Oxides
SVOC	Semivolatile organic compound
VOC	Volatile organic compound

6.0 *REMEDIAL ALTERNATIVES DESCRIPTION*

The four remedial alternatives developed for evaluation of their ability to meet the site RAO are described in this section. These include:

- Alternative 1: No Action
- Alternative 2: Institutional Controls
- Alternative 3: Excavation and Off-Site Disposal
- Alternative 4: Excavation and On-Site Treatment with Thermal Desorption.

The evaluation of the four remedial alternatives based on applicable screening criteria is discussed in Section 7. A comparative analysis of remedial alternatives and the recommended remedial alternative for addressing the site RAO are presented in Section 8.

6.1 *PARAMETERS USED TO DEVELOP AND EVALUATE REMEDIAL ALTERNATIVES*

This section describes the site parameters used to develop conceptual designs and evaluate each remedial alternative. These site parameters, which were also utilized to develop cost estimates and perform cost comparisons of each remedial alternative, include the following:

- *Site Surface Area*: The site is approximately 2,500 feet by 1,100 feet. Cost estimates prepared for each remedial alternative utilize a site surface area of 63.1 acres.
- *Depth to the Water Table*: The water table is approximately 5 feet bgs at the site.
- *Depth to the Top of the Marsh Crust*: Based on physical factors such as proximity to the former shoreline and mean high tide, the depth to the top of the marsh crust at the site is assumed to be similar to that found at Alameda Point (approximately 8 feet bgs).
- *Thickness of the Marsh Crust*: The thickness of the marsh crust at the site is assumed to be 1.5 feet.

6.2 *ALTERNATIVE 1 - NO ACTION*

No remedial action would be taken under Alternative 1. The physical condition of the marsh crust would remain unchanged. No institutional controls, containment, removal, or treatment would be implemented, and no other mitigating actions would be taken to restrict risk to human health and the environment that may result from potential contamination within the marsh crust at the site. Although there are existing governmental, state, and local controls for the management of contaminated soils, these could be changed in the future without regard for how these changes would affect human health.

The no action alternative is evaluated to satisfy the requirements of 40 CFR Part 300.430[e][6], which requires consideration of the no action alternative as a baseline against which other remedial alternatives are compared.

6.3 *ALTERNATIVE 2 - INSTITUTIONAL CONTROLS*

Under Alternative 2, institutional controls enforceable by DTSC and the City of Alameda would be implemented to restrict excavation into the marsh crust without undertaking proper procedures to ensure that new exposure pathways are not created. This alternative involves the City of Alameda entering into a land-use covenant with DTSC and enacting the Marsh Crust Ordinance. No active engineering or construction would be conducted under this alternative.

6.3.1 *Remedial Action Components for Alternative 2*

The remedial action components that constitute Alternative 2 are described below.

6.3.1.1 *Land-Use Covenant*

Concurrent with property transfer, DTSC and the City of Alameda will enter into and record a binding agreement to enter into the land-use covenant. The covenant defines the excavation measures and provides assurances for their future enforcement. A copy of the proposed land-use covenant is included as Appendix A to this RAW.

6.3.1.2 *Excavation Ordinance*

The City of Alameda would enact an excavation ordinance that defines the depth to which occupants can excavate site soil without taking special measures and the measures that must be followed when excavating below that depth. A copy of this City of Alameda approved ordinance is included in Appendix B to this RAW. The ordinance includes provisions similar to those described below.

Anyone wanting to excavate at the site would first be required to contact the Chief Building Official to determine the threshold depth of marsh crust in the area of planned excavation. Figure B-1 shows the depth to potential marsh crust at the site, from which the threshold depth will be derived for the purposes of the covenant and ordinance. No permit would be required if excavation would not occur below the threshold depth. In addition, no permit would be required for activities such as pile driving if soil from below the threshold depth will not be brought above the threshold depth and workers will not be exposed to the soils. If any part of the excavation would occur below the threshold depth, a permit must be obtained from the Chief Building Official. The permittee would be required to have an H&S plan developed to ensure the protection of the workers and the public. After obtaining a permit for excavation, the permittee would be required to notify the Chief Building Official at least 48 hours prior to the commencement of excavation activities. Underground Services Alert must also be notified.

Soil below the threshold depth would be considered, by default, to be hazardous. The permittee could choose to disprove this assumption to the satisfaction of the Chief Building Official by analytical testing. The permittee could use existing information, if relevant, or analytical results obtained from new soil samples. No additional controls would be required if it is determined that hazardous materials are not present below the threshold depth in the area of excavation. However, if hazardous materials are encountered below the threshold depth at any time during sampling or excavation activities, the permittee would be required to manage all soil below the threshold depth as a hazardous material, following either of the options below.

Rather than performing analytical tests on soil samples, the permittee could elect to assume that the soil below the threshold depth is hazardous. The permittee would then have two options for compliance with the ordinance:

- Under option 1, all soil would be disposed of off site. Soil could not be stockpiled or used as backfill.
- Under option 2, the permittee would be required to hire a registered professional engineer or registered geologist to develop a construction site management plan and sampling plan to define the appropriate management of stockpiled soil from below the threshold depth.

6.3.1.3 *Five-Year Reviews*

Regular reviews would be performed every 5 years to ensure long-term compliance with institutional controls.

6.4 *ALTERNATIVE 3 - EXCAVATION AND OFF-SITE DISPOSAL*

Although site risks are currently within the risk management range, Alternative 3 would involve excavation to an average depth of approximately 9.5 feet across the site and off-site disposal of marsh crust soils at a Class I or II landfill. Excavation would involve site preparation; dividing the site up into several areas that could be accessed by the construction equipment; excavating and stockpiling the overburden; excavating the marsh crust; confirmation sampling to show that the marsh crust has been removed; and backfilling and restoring excavated areas with overburden and clean fill. Alternative 3 would also include the treatment of contaminated ground water removed from excavation pits during dewatering for excavation. The remedial action components that constitute Alternative 3 are described below.

6.4.1 *Site Preparation*

Site preparation activities would include clearing and removing vegetation, constructing run-on and runoff controls for surface drainage, constructing decontamination facilities, demolishing buildings, removing concrete aprons and asphalt pavement, removing bins, relocating utilities, and removing railroad spurs and fences, as necessary. Site preparation work would also include setting up on-site staging areas, installing temporary fencing, and surveying excavation areas.

6.4.2 *Excavation, Stockpiling, Disposal, and Backfilling*

Marsh crust is presumed to exist throughout all 63.1 acres of the site. The marsh crust would be identified using a cleanup level established for the

soil that is protective for future exposures due to construction activities. This cleanup level was not developed as part of the RAW, but it is assumed that the chemicals in the marsh crust are contained within a layer of surrounding soil 1.5 feet thick.

Excavation activities would consist of excavating the entire surface area of the site to an average depth of 9.5 feet, approximately 1.5 feet below the average depth of the marsh crust. Clean fill and contaminated soil would be excavated mechanically using standard construction equipment, such as scrapers, drag lines, dump trucks, and bulldozers. The first 5 feet of soil would be dry and clean and stockpiled separately on site. The next 4.5 feet (3 feet of clean overburden and 1.5 feet of marsh crust) would require excavation with drag because the soil is saturated at a depth greater than 5 feet. An estimated total volume of 1.06 million cubic yards would be generated as clean overburden excavated from the 8 feet of clean soil from the site. The estimated volume of contaminated soil would be about 198,513 cubic yards. Shoring would be used when the depth of excavation exceeds 5 feet bgs.

Marsh crust would be screened visually, and uncontaminated material would be separated from contaminated soil. Dust would be controlled by spraying water on contaminated soil with a mobile water source during excavating, staging, and loading activities. Contaminated material would be transported in covered trucks to a Class I or II landfill. The soil would be characterized to determine disposal location. Prior to off-site disposal, contaminated soils would be stockpiled within the area of contamination.

The site would be divided into multiple excavation areas. Stockpile management areas would be set up as needed. Excavation would be conducted in one area, with other areas used for the stockpiling of overburden. Areas where remediation is completed would be used to place stockpiles from the next area to be excavated. Clean soil and overburden and contaminated marsh crust would be stockpiled separately at the site before disposal.

Once the excavation is complete, the excavation area would be surveyed and backfilled using clean overburden and replacement fill, after which the area would be compacted and regraded to original condition. The site would then be restored equivalent to surrounding conditions. After backfill and compaction, the remedial action for the site would be complete.

6.4.3 *Ground Water Management*

Pump and piping systems would be used to remove water encountered during excavation. An estimated 19 million gallons of water would be pumped during excavation operations (saltwater intrusion quantities during excavation were found to be negligible). This water would be treated using granular activated carbon units, and the disposal of treated water would be to the San Francisco Bay under National Pollutant Discharge Elimination System or under a wastewater discharge permit to the local Publicly Owned Treatment Works (East Bay Municipal Utility District). Temporary sheet pile walls would be constructed around excavation areas to prevent or minimize seawater intrusion.

6.5 *ALTERNATIVE 4 - EXCAVATION AND ON-SITE TREATMENT WITH THERMAL DESORPTION*

Alternative 4 consists of excavation of the marsh crust, on-site treatment of the marsh crust using the thermal desorption process, and backfilling and restoration of excavation areas with treated soil. The remedial action components that constitute Alternative 4 are described below.

6.5.1 *Site Preparation*

Site preparation activities would be the similar to those described in Section 6.4.1 for Alternative 3.

6.5.2 *Excavation, Stockpiling, Disposal, and Backfilling*

Excavation, backfilling with clean overburden and fill, and restoration activities for removal and treatment of the marsh crust underlying the site would be similar to the activities described in Section 6.4.2 for Alternative 3.

6.5.3 *Ground Water Management*

Management of ground water encountered during excavation would be similar to the activities described in Section 6.4.3 for Alternative 3.

6.5.4 *Thermal Desorption*

For thermal desorption, a vendor would mobilize a thermal desorption unit to the site and set it up in a predetermined location. Auxiliary

equipment, including a loader, crusher, screening plant, and feed belt conveyor, would also be provided. A cleanup goal for treated soil would be established that is protective of future exposure due to construction activities. This cleanup goal was not developed for use in this RAW, because the absence of a cleanup goal does not significantly affect the evaluation of this alternative.

The thermal desorption process has been used successfully as a full-scale soil remediation technology to treat organic contaminants such as VOCs and SVOCs, including PAHs (USEPA, 1993a). It would be operated at a temperature sufficient to volatilize PAH contaminants in the marsh crust but not destroy the contaminants. The desorption unit would heat contaminated soil, and water and contaminants would be volatilized. An inert gas, such as nitrogen or oxygen-deficient (less than 4 percent) combustion off-gas, would be injected as a sweep stream. Organic compounds in the off-gas would be collected and burned in an afterburner. Particulate matter would be removed by conventional air pollution control methods.

Operation of the thermal desorption system would create the following process residual streams: treated soil; untreated, oversized rejects; condensed contaminants and water; particulate control-system dust; clean off-gas; and spent carbon, if used. Treated soil, debris, and oversized rejects could be suitable for return on site. Treated condensed water and treated scrubber purge water (blowdown) could be purified and returned to the site wastewater treatment facility (if available), sent for disposal to a sewer system, or used for rehumidification and cooling of the hot, dusty media. Trial-burn test runs would be required before implementing this alternative.

Clean off-gas would usually be released to the atmosphere, although systems that use an inert gas (for example, nitrogen) would recycle the gas to the desorber after treatment. Residual treated soil would remain stockpiled on site until receipt of analytical results. Treated soil would be tested for PAHs to verify the effectiveness of the treatment processes and demonstrate that the soil no longer exhibits hazardous waste characteristics or poses a threat to human health or the environment. The soil would then be used to fill excavated areas. All soil would be stockpiled within the area of contamination prior to treatment.

7.0 *REMEDIAL ALTERNATIVES EVALUATION*

In this section, the four alternatives identified in Section 6.0 for addressing the RAO for the site are evaluated against the criteria presented below in Section 7.1.

7.1 *REMEDIAL ALTERNATIVES EVALUATION CRITERIA*

The detailed analysis of alternatives is based on the nine evaluation criteria specified by the NCP (40 CFR section 300.430(e)(9)(iii)) and the guidance for conducting RIs and FSs under CERCLA (USEPA 1988a). The nine evaluation criteria are described as follows:

- **Overall protection of human health and the environment.** This criterion describes the way that each alternative as a whole protects human health and the environment. Evaluation focuses on a specific alternative's ability to achieve adequate protection and describes the way site risks passed through each pathway are eliminated, reduced, or controlled through treatment, engineering, or institutional controls. This evaluation also allows for consideration of any unacceptable short-term or cross-media impacts associated with each alternative.
- **Compliance with ARARs.** This criterion evaluates each alternative's compliance with federal and state ARARs and TBC requirements. If an ARAR waiver is required, this criterion evaluates the approach taken to justify the waiver. ARARs address location-specific, chemical-specific, and action-specific concerns.
- **Long-term effectiveness and permanence.** This criterion addresses the risk remaining at the site after RAOs have been met. The primary focus of this evaluation is the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and untreated wastes. Factors considered include the magnitude of residual risks and adequacy and reliability of release controls.
- **Reduction of toxicity, mobility, or volume through treatment.** This criterion addresses the statutory preference for remedial alternatives that employ treatment technologies for permanent and significant reduction of toxicity, mobility, and volume. This evaluation focuses on (1) the treatment processes and materials treated; (2) the amount of hazardous materials that will be destroyed or treated; (3) the degree of expected reduction in toxicity, mobility, or volume measured as a

percentage of reduction (or order of magnitude); (4) the degree to which the treatment will be irreversible; (5) the type and quantity of treatment residuals; and (6) the ability of the alternative to satisfy the statutory preference for treatment as a principal element.

- **Short-term effectiveness.** This criterion examines the effectiveness of each alternative in protecting human health and the environment during the construction and implementation period until the RAOs are met. Four factors are considered when assessing the short-term effectiveness of an alternative: (1) protection of the community during remedial actions, (2) protection of workers during remedial actions, (3) environmental impacts of remedial actions, and (4) time required to complete the remedial action to achieve the RAOs.
- **Implementability.** This criterion evaluates the technical and administrative feasibility of each alternative and the availability of various services and materials required during its implementation.
- **Cost.** This criterion addresses capital costs, both direct and indirect; annual operation and maintenance (O&M) costs; accuracy of the cost estimate; present worth analysis; and cost-sensitivity analysis of alternatives. Cost estimates for alternatives were prepared from cost information included in (1) environmental cost handling options and solutions (R.S. Means Company, 1997a); (2) heavy construction cost data (R.S. Means Company, 1997b); (3) remedial action cost engineering and requirements system (Delta Technologies Group, Inc. 1997); (4) CostPro closure and post-closure estimating software users manual (TtEMI, 1997). Capital and O&M cost estimates have an expected accuracy of minus 30 to plus 50 percent. Cost estimates for each alternative are included in Appendix C.
- **State acceptance.** This criterion evaluates technical and administrative issues and concerns that the state may have regarding each of the alternatives. This criterion is not addressed in this RAW but will be addressed in the ROD after comments are received from the state.
- **Community acceptance.** This criterion evaluates the issues and concerns that the public may have regarding each of the alternatives. This criterion is not addressed in this RAW but will be addressed in the ROD after public comments have been received on the proposed plan.

The first two criteria are categorized as threshold criteria; they relate directly to statutory requirements that each remedial alternative must meet. If a given alternative does not satisfy both of these criteria, then it is

not retained for further consideration beyond the individual analysis of alternatives. The next five are the primary balancing criteria upon which the selection of the remedy is based. Together, these first seven criteria are considered to be the evaluation criteria; the final two are modifying criteria.

In the following sections, each alternative is evaluated against the seven evaluation criteria and comparatively analyzed to assess the relative performance of each alternative with respect to these criteria. The remaining two criteria, the modifying criteria, will be addressed in the ROD when comments are received from the state and public on the proposed plan.

7.2 *REMEDIAL ALTERNATIVES EVALUATION*

This section evaluates each of the four alternatives against the seven CERCLA evaluation criteria.

7.2.1 *Alternative 1 - No Action*

The evaluation of Alternative 1 for addressing the RAO is presented in the following subsections.

7.2.1.1 *Overall Protection of Human Health and the Environment*

There is currently no risk to human health or the environment from the marsh crust at the site because there is no exposure pathway. The marsh crust at the site (if present) is currently isolated from human and ecological receptors because it is inaccessible, under an average of 8 feet of fill material. It is, however, assumed that future construction at the site could result in the marsh crust being brought to the surface, where it could remain as a source of exposure to future occupants. For purposes of this RAW, it is assumed that the marsh crust at the surface could pose a threat to future residents. Because of this concern, the no action alternative may not be protective of human health and the environment.

7.2.1.2 *Compliance with ARARs*

No ARARs would apply to Alternative 1 for the marsh crust.

7.2.1.3 *Long-Term Effectiveness and Permanence*

At the site, existing marsh crust contamination poses no unacceptable risks to human health under current and likely future land use scenarios because there is no exposure pathway. Under likely future scenarios, approximately 8 feet of fill will continue to cover the marsh crust at the site and is unlikely to be removed or eroded. It is, however, assumed that future construction at the site could result in contamination from the marsh crust being brought to the surface, where it could become a source of exposure and potential risk to future occupants. Because of the possibility of exposure to contaminants from the marsh crust brought to the surface during construction activities, the no action alternative may not be effective over the long term.

7.2.1.4 *Reduction of Toxicity, Mobility, or Volume through Treatment*

This alternative would not reduce the toxicity, mobility, or volume of contaminants in the marsh crust because contaminated marsh crust would not be treated, contained, or removed. Therefore, the no action alternative for the marsh crust would not satisfy this criterion because no treatment is involved.

7.2.1.5 *Short-Term Effectiveness*

This criterion examines the effectiveness of the alternative during construction and implementation of the remedy until the RAO is met. Since no remedial action is involved under the no action alternative, there are no new health risks to the community, current occupants, workers or the environment in the short term. Therefore, Alternative 1 is considered to be highly effective in the short term.

7.2.1.6 *Implementability*

Since this alternative involves no action, there are no technical administrative difficulties involved with implementing this alternative. Therefore, implementability of this alternative is considered to be high.

7.2.1.7 *Cost*

No capital or O&M costs are associated with Alternative 1.

7.2.2 *Alternative 2 - Institutional Controls*

The evaluation of Alternative 2 for addressing the RAO is presented in the following subsections.

7.2.2.1 *Overall Protection of Human Health and the Environment*

Risk to human health or the environment from the marsh crust at the site is within the risk management range. However, future excavation activities could bring material to the surface and expose future occupants. The institutional controls would regulate uncontrolled disposal of the marsh crust and would implement an enforcement mechanism through the City of Alameda and DTSC. Human health and the environment would be protected by requiring that excavated soil be handled and disposed of so as to prevent exposure.

Because institutional controls would reduce the already low likelihood of exposure to the marsh crust, Alternative 2 is protective of human health and the environment.

7.2.2.2 *Compliance with ARARs*

No ARARs would apply to Alternative 2 for the marsh crust.

7.2.2.3 *Long-Term Effectiveness and Permanence*

This alternative would be effective in the long term because its implementation would become part of DTSC's ongoing governmental regulatory system. The land-use covenant will be in the chain-of-title, which will put all future owners on notice. This type of recorded covenant has more "permanence" because the institutional control would reduce the probability that future occupants will excavate the marsh crust without taking proper precautions. Should the City of Alameda decide to change or eliminate the excavation ordinance, the covenant would require DTSC to approve any projects involving excavation into the marsh crust and related sediments.

For as long as the City of Alameda maintains an ordinance that requires, by permit, management of marsh crust soil that is at least as rigorous as that required by DTSC, DTSC will conduct annual review of the program to ensure that permits are properly issued. In addition, DTSC retains the right to require that placement of contaminated soil not in accordance with the covenant be removed and properly disposed of, even if a permit

was issued by the City of Alameda. Furthermore, the ordinance is a convenient and efficient means of ensuring that the terms of the covenant are met, but the covenant is the remedy, irrespective of continued existence of the ordinance.

This alternative is effective for the following reasons:

- The waste is deeper than anticipated normal landscape and light construction excavations will penetrate;
- Excavation below the threshold depth is anticipated to be an infrequent event;
- Excavation below the threshold depths will be conducted mostly by developers or City of Alameda staff conducting utility work or road work, for example. It is DTSC's experience that development contractors and city public works staff do not routinely ignore requirements such as those of the covenant; and
- The requirements for managing marsh crust soils are limited and not so onerous as to encourage disregard of the covenant.

This alternative is effective over the long term.

7.2.2.4 *Reduction of Toxicity, Mobility, or Volume through Treatment*

This alternative would not reduce the toxicity, mobility, or volume of contaminants in the marsh crust because contaminated material would not be treated, contained, or removed. The institutional control alternative would not, therefore, satisfy this criterion because no treatment is involved. For this reason, the effectiveness of this alternative in reducing toxicity, mobility, or volume is low, although implementation of the institutional control should provide for safe management of any excavated hazardous materials.

7.2.2.5 *Short-Term Effectiveness*

This criterion examines the effectiveness of the alternative during construction and implementation of the remedy until the RAO is met. Because Alternative 2 would involve no remedial construction, no new short-term health risks are caused to the community, current occupants, workers, or the environment. The institutional controls could be implemented within a short period of time. Alternative 2 is, therefore, considered to be highly effective in the short term.

7.2.2.6 *Implementability*

No construction would be required to implement Alternative 2. The only administrative consideration is that the excavation ordinance would have to be passed into law by the Alameda City Council, and the land use covenant would have to be executed by the City of Alameda and DTSC and recorded. Legal services to implement this alternative are available to DTSC and the City of Alameda. Therefore, this alternative is readily implementable.

7.2.2.7 *Cost*

No known capital or O&M costs would be associated with this alternative; however, some costs would be associated with the administrative effort to complete the land use covenant as well as to pass the excavation ordinance, and to monitor compliance with these requirements. The costs are estimated to be approximately $48,720 (Appendix C). These costs are for 5-year reviews to ensure long-term compliance with this alternative (for a period of 30 years) and other costs associated with implementing and monitoring the institutional controls.

7.2.3 *Alternative 3 - Excavation and Off-Site Disposal*

The evaluation of Alternative 3 for addressing the RAO is presented in the following subsections.

7.2.3.1 *Overall Protection of Human Health and the Environment*

Implementation of Alternative 3 could in the long run provide overall protection of human health and the environment. This alternative would permanently eliminate threats to human health by removing the source of the contamination at the site and eliminating potential pathways, resulting in very small residual risks. Even minimal site risks from exposure to the marsh crust would be removed. Compliance with ARARs during implementation of this alternative would protect human health. The RAO would be achieved, though only after the several years required for soil removal activities.

Excavation and removal would generate a large volume of marsh crust material and ground water during excavation. The excavation alternative could also create substantial and costly short-term risks to the community, site workers, and the environment. The excavation, stockpiling, and transportation of an estimated 198,513 cubic yards of marsh crust would

require approximately 9,930 truck trips (approximately 60 loads per day for 170 days, assuming 30 trucks are available at the site) back and forth to the landfill, assuming that each truck holds 20 cubic yards. An estimated 19 million gallons of water would be generated, all of which would have to be tested (possibly treated) and disposed of. Workers would be exposed to potential risks from operation of equipment in deep excavations and from handling large volumes of marsh crust. Residents of the City of Alameda would have to bear the danger and inconvenience of a large increase in truck traffic and a potential increase in health risks from fugitive dust emissions and diesel exhaust, although protective measures would be undertaken during excavation and transport of marsh crust to mitigate these risks to the community. Although this alternative would be extremely disruptive in the short term, it would be, in the longer term, protective of human health and the environment.

7.2.3.2 *Compliance with ARARs*

No chemical-specific ARARs have been identified for Alternative 3. Alternative 3 would comply with all location- and action-specific ARARs introduced in Section 5.2.4.3. The Navy would comply with all hazardous waste ARARs identified for excavation and handling of contaminated media.

Alternative 3 would satisfy the criterion of compliance with ARARs.

7.2.3.3 *Long-Term Effectiveness and Permanence*

The removal and off-site disposal of the marsh crust at the site would meet the RAO by eliminating the source of contamination and potential pathways. Residual risks would be permanently eliminated by removing the source. Excavation and disposal are proven and reliable technologies that would effectively remove the marsh crust and thus permanently reduce the possibility of human exposure to the materials. No long-term management would be needed, though monitoring could be required to verify total removal. Alternative 3, therefore, would be highly effective over the long term.

7.2.3.4 *Reduction of Toxicity, Mobility, or Volume through Treatment*

Alternative 3 would not reduce the toxicity, mobility, or volume of hazardous substances removed from the site, because the marsh crust would not be treated, contained, or reduced in volume. Instead, all the marsh crust would be unearthed and removed from one location and

transported and deposited at another. Alternative 3 would not satisfy CERCLA's preference for treatment as a principal element or the NCP's presumption against off-site land disposal of untreated waste (40 CFR 300.430 (f)(1)(ii)(E)). Only the principal long-term risks at the site would be reduced by permanently removing the source of contamination. For this reason, the effectiveness of this alternative in reducing toxicity, mobility, or volume is low.

7.2.3.5 *Short-Term Effectiveness*

The scale of excavation and disposal operations for the marsh crust significantly impact the short-term effectiveness of this alternative. As stated above, construction would be disruptive and could create health risks for the community, site workers, and the environment in the short term.

Measures would be taken while excavating, staging, loading, and transporting the marsh crust to reduce and control short-term risks to the community. For example, dust suppression measures would be used to reduce generation of fugitive dust. The extent of fugitive dust generation would be monitored to determine that these measures are effective. Furthermore, site access would be controlled to reduce the potential for direct contact with contaminated soil by installation of temporary fences during excavation. Increased truck traffic would be difficult to reroute because routes into the site are limited.

Potential hazards to workers would include inhalation of, absorption of, and contact with hazardous substances in contaminated soil. On-site workers would wear personal protective equipment during contaminated soil excavation activities. Air monitoring would be conducted to assist in determining the required level of protection. Potential risks to site workers could be controlled with proper equipment and H&S plans.

Engineering controls would be used to minimize any impacts on the environment. Surface drainage controls and appropriate equipment decontamination procedures would be used to prevent transport of contaminated soil to uncontaminated areas.

It is estimated on the basis of assumptions used in Appendix C that about 2 years would be required to mobilize necessary equipment, excavate the marsh crust, transport the soil to a Class I or II landfill, restore the site, and demobilize. An additional 12 month period would be needed to conduct

predesign studies, prepare the remedial design (including all associated plans), and consult with appropriate agencies.

The excavation and disposal alternative would require a highly organized and costly effort to control the short-term impacts to the community, site workers, and the environment. Though measures could be taken to protect human health and the environment, risks presented by emissions of possibly contaminated dust to the community, workers, and the environment would be considerable. Accordingly, Alternative 3 is considered to have low effectiveness in the short term.

7.2.3.6 *Implementability*

Alternative 3 would be difficult to implement. Special equipment, shoring, and continuous dewatering would be required during excavation. Infiltration of seawater and tidal fluctuations would make large excavation activities below the ground water even more difficult. Large quantities of contaminated ground water would be generated and would probably require treatment before disposal. Additionally, the extent of the marsh crust is uncertain, and delineation of it would be difficult below the water table at the proposed excavation depth. Delays would be expected from uncontrolled infiltration of water in excavation pits. The availability and schedule of disposal facilities would also be problematic because of the large volume of soil requiring disposal. General and special earthwork construction equipment would be required for this alternative. Excavation and analytical specialists would be required and would be available. Removal and disposal technologies have been developed and demonstrated at many sites, but complex site conditions (such as the location of the marsh crust, the ground water table, tidal influences, and infiltration of seawater), would make excavation operations difficult.

Because of the scale and complexity of the action, the implementability of Alternative 3 is considered to be low.

7.2.3.7 *Cost*

The present worth cost for Alternative 3 is approximately $131,429,129 and is detailed in Appendix C. These costs include additional characterization of the marsh crust, excavation and backfilling, waste transport and disposal, and other miscellaneous costs and contingencies.

7.2.4 *Alternative 4 - Excavation and On-Site Treatment with Thermal Desorption*

The evaluation of Alternative 4 for addressing the RAO is presented in the following subsections.

7.2.4.1 *Overall Protection of Human Health and the Environment*

Implementation of Alternative 4 would provide for overall protection of human health and the environment by eliminating the source of contamination at the site. Residual risks would be very small after implementing this alternative. Compliance with ARARs during implementation of this alternative would protect human health and the environment. Alternative 4 meets the RAO by permanently removing the marsh crust and by treating contaminated soil and other waste streams on site. The marsh crust would be treated by the thermal desorption process. Other waste streams would be treated and eliminated. Overall, this alternative has short-term risks similar to those of Alternative 3, although risks to the community are further reduced under this alternative because of reduced transport of contaminated materials. Moderate short-term risk to workers and the environment would be created, and these risks are similar to those described under Alternative 3.

7.2.4.2 *Compliance with ARARs*

No chemical-specific ARARs have been identified for Alternative 4. Alternative 4 would comply with all location- and action-specific ARARs. As stated in Alternative 3, the site owner would comply with all hazardous waste ARARs identified for excavation and handling of contaminated media, and these same ARARs would be followed for this alternative. The ARARs are described under Alternative 4 in Section 5.2.4.4.

Alternative 4 would satisfy the criterion of compliance with ARARs.

7.2.4.3 *Long-Term Effectiveness and Permanence*

The removal and on-site treatment of the marsh crust would eliminate the source of contamination. Under Alternative 4, the marsh crust would be removed and treated on site using a thermal desorption process. Excavation and on-site treatment with thermal desorption are established technologies that would meet the RAO after approximately 2 years. If the process is implemented properly and performs well for contaminants in

the marsh crust, no possibility of future exposure to PAHs found in the marsh crust would exist. A proof-of-performance test is required for reliability of the thermal desorption process for contaminants in the marsh crust. Because the marsh crust would be removed, Alternative 4 is considered to be highly effective over the long term.

7.2.4.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Excavation and thermal desorption treatment processes would reduce the toxicity, mobility, and volume of the marsh crust contaminants.

The entire mass or volume of the marsh crust at the site would be treated and destroyed by the thermal desorption process under Alternative 4. Results from a variety of Superfund Innovative Technology Evaluations demonstrations and full-scale cleanup studies indicate that thermal desorption systems could effectively remove contaminants to low residual concentrations or to concentrations below detection limits in treated soil. However, trial-burn tests would be required to confirm the effectiveness of the thermal desorption system.

The mass, mobility, and volume of contaminants would be reduced by nearly 99.99 percent through thermal desorption in combination with off-gas destruction by an afterburner. The effects of the thermal desorption treatment would be irreversible, because toxic contaminants would be removed permanently and destroyed in the off-gas treatment system. Treatment residuals would not pose any risks. Alternative 4 would satisfy the statutory preference for treatment as a principal element of the remedy. Alternative 4, therefore, is considered to be highly effective at satisfying the criterion of reduction of toxicity, mobility, or volume through treatment.

7.2.4.5 Short-Term Effectiveness

Short-term risks to workers and the community during soil excavation activities are discussed previously in Section 7.2.3.5 (under Alternative 3). Risks to the community are lower than under Alternative 3 because of reduced transport of contaminated materials. However, potential risks from fugitive dust would be similar. In addition, the community could be exposed to emissions of unburned SVOCs in off-gas from the afterburner. This potential exposure would be minimized by developing standards for off-gas and dust emissions. Compliance with standards would be demonstrated during trial-burn testing and by testing during remedial activities. Fugitive emissions at the feed point of the thermal desorption

unit would be controlled by enclosing screens and feed conveyors; fugitive emissions from the discharge point of the thermal desorption system would be controlled by quenching hot, dry solids.

Alternative 4, excavation and on-site treatment, requires a highly organized and costly effort to control short-term risks. However, since transportation of large volumes of excavated marsh crust to an off-site disposal facility would not occur under this alternative, it would cause less short-term risk to the community than Alternative 3. This alternative, therefore, is considered to be low to moderately effective in the short term.

7.2.4.6 Implementability

Alternative 4 would encounter the same difficulties during excavation as those described under Alternative 3 in Section 7.2.3.6. Additional implementability concerns would exist related to the performance and control of the on-site thermal desorption unit to treat the large volume of soil.

Implementability of Alternative 4 is considered to be low because of the scale of the effort and the complex nature of site conditions.

7.2.4.7 Cost

The present worth cost for Alternative 4 would be approximately $81,773,340 (see Appendix C). These costs include additional characterization of the marsh crust, excavation and backfilling, on-site treatment of the marsh crust, and other miscellaneous costs and contingencies.

8.0 *COMPARATIVE ANALYSIS OF ALTERNATIVES AND RECOMMENDATIONS*

The following discussion summarizes the degree to which the various remedial alternatives meet the evaluation criteria and presents a recommendation for the preferred alternative.

8.1 *COMPARATIVE ANALYSIS OF ALTERNATIVES*

The comparative analysis of remedial alternatives evaluates the relative performance of each alternative with respect to seven of the nine specific NCP evaluation criteria presented in Section 7.1. The first two applicability criteria (overall protection of human health and the environment and compliance with ARARs) serve as threshold criteria in that they must be met by an alternative to be eligible for selection. The next five applicability criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost) serve as balancing criteria that are compared so that major tradeoffs among the alternatives are identified and weighed in the decision-making process. The last two criteria, state acceptance and community acceptance, will be addressed in the ROD following comment by the state on the RAW report and proposed plan and comment by the public on the proposed plan. Table 8-1 summarizes the effectiveness of the four alternatives for the site as compared to the seven criteria.

The purpose of this comparative analysis is to identify the relative advantages and disadvantages of each alternative and thereby provide a sound basis for remedy selection that is consistent with the NCP. The NCP states, "the national goal of the remedy selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste."

The comparative analysis presented in the following sections provides the information needed to determine the alternative or set of alternatives that best satisfies the goals of the NCP.

8.1.1 *Overall Protection of Human Health and the Environment*

All alternatives, even Alternative 1, would protect human health and the environment under current and likely future land uses. Future construction at the site could result in contamination from the marsh crust being brought to the surface. In such an event, Alternative 1 (no action) may not be protective. Alternative 2 (institutional controls) provides a reliable method of ensuring that landowners do not excavate the marsh crust without proper procedures. Although Alternatives 3 and 4 are best at eliminating potential contamination in the marsh crust in the long term, the magnitude of effort to implement these alternatives is significant when considering that risks are within the risk management range under likely current and future scenarios. With regard to short-term risks, Alternatives 1 and 2 are more effective in protecting the community, current occupants, site workers, and the environment because no construction activities would be undertaken. Significant disruption to the environment and the community would be caused by construction activities involved in implementing Alternatives 3 and 4.

8.1.2 *Compliance with Applicable or Relevant and Appropriate Requirements*

No ARARs apply to Alternatives 1 and 2 for the marsh crust. No chemical-specific ARARs have been identified for Alternatives 3 and 4. Both Alternatives 3 and 4 would comply with all location- and action-specific ARARs.

8.1.3 *Long-Term Effectiveness and Permanence*

Alternatives 3 and 4 would provide the highest level of long-term effectiveness and permanence because the marsh crust would be excavated, thereby leaving no significant residual risks and removing the potential for exposure to hazardous substances in soil. Both Alternatives 3 and 4 would be adequate and reliable in concept because they would result in the removal of the marsh crust. The potential for residual risks from contaminants in the marsh crust would remain under Alternative 2; however, protection of human health would be achieved by restricting excavation in the marsh crust unless H&S and disposal procedures were followed to minimize exposure. No remedial action would be conducted under Alternative 1; therefore, Alternative 1 would provide no long-term effectiveness or permanence, and residual risk would remain at the site in the unlikely event that marsh crust soils are brought to the surface.

8.1.4 *Reduction of Toxicity, Mobility, or Volume through Treatment*

Alternative 4 would provide the greatest reduction in the toxicity, mobility, and volume through treatment of contaminants in the marsh crust. None of the other alternatives use treatment to reduce toxicity, mobility, or volume.

8.1.5 *Short-Term Effectiveness*

Because no site construction would be required under Alternatives 1 and 2, both alternatives would provide the highest level of short-term protection to the community, workers, and the environment. Both Alternatives 3 and 4 are considered less effective in the short term because of the large-scale excavation and the handling of large quantities of contaminated soil and ground water (during dewatering activities). In addition, Alternative 3 could cause an additional short-term risk to the community because of the large number of truck trips that would occur while transporting soil from the marsh crust off site for disposal.

Implementation of Alternatives 1 and 2 would have no impact on the environment, because no construction activities would be involved. Both Alternatives 3 and 4 would have significant, short-term adverse impacts to the environment because of (1) the complex nature of excavation of a large volume and area below the ground water table and (2) the treatment and handling of a large volume of contaminated soil or residual treatment materials.

Alternative 2 would require a minimal amount of time to implement, whereas Alternatives 3 and 4 would take several years to implement.

8.1.6 *Implementability*

Alternative 1 would be easy to implement, because no action would be taken. Alternative 2 could be implemented without significant delays, because no construction activities are involved. Both Alternatives 3 and 4 would be difficult to implement because of the complex nature of site conditions described previously, excavation of a large volume and area below the ground water table, and the handling requirements of a large volume of contaminated soil and treatment residuals.

8.1.7 *Cost*

No known costs would be associated with Alternative 1. Alternative 2 would cost about $48,720 to implement institutional controls for the site. The estimated cost of implementing Alternatives 3 and 4 would be $131 million and $82 million, respectively. Though these cost figures are only estimates, with an estimated margin for error of between 30 and 50 percent, these costs would be vastly greater than the costs for Alternatives 1 and 2. The costs of implementing Alternatives 3 and 4 are grossly excessive when compared to Alternatives 1 and 2.

8.2 *ADDITIONAL CRITERIA EVALUATED FOR ALTERNATIVE 2*

In addition to the above seven criteria, DTSC evaluated other environmental conditions with the potential for adverse effects in their *California Environmental Quality Act Special Initial Study for Removal Action Workplan for Parcels 170 and 171, Former Alameda Naval Air Station* (Initial Study). The following six conditions represent those determined to be potentially significant.

8.2.1 *Potential Impacts to Air*

The covenant restrictions include preparation of an H&S plan by a certified industrial hygienist to protect workers at the excavation site and the general public, and conducting all excavation and materials handling activities in accordance with applicable BMPs.

No degradation of air resources is anticipated. No emissions from mobile or stationary sources will result from the adoption of the institutional control proposed by DTSC, and no earthmoving will take place.

8.2.2 *Potential Impacts to Surface and Ground Water*

The proposed institutional controls will not authorize excavation into ground water or extraction of ground water. The proposed controls are intended to prevent pollution of surface waters by runoff from contaminated soil that is excavated. No changes to riparian land, rivers, streams, watercourses or wetlands would result from the proposed action. No effects on water resources are anticipated to take place as a result of this action.

8.2.3 *Potential Impacts to Land Use*

The proposed remedy to address and control possible releases of PAH from the marsh crust to the surface is a covenant to restrict specific use of the property (environmental restrictions), between the City of Alameda as the future owner of the property, and DTSC. The restriction involves controls on excavation and management of soil excavated from the subsurface marsh crust layer and brought to the surface through construction or other activities. Pursuant to California Civil Code section 1471(c), DTSC has determined that the covenant is reasonably necessary to protect present or future public health and safety or the environment. DTSC therefore intends that excavation of contaminated soil be restricted. The restrictions shall run with the land, pass with each and every portion of the property, and be enforceable by DTSC. The restrictions shall be incorporated by reference in each and all deeds, leases, and subleases of any portion of the property. This restriction is not intended, nor is it likely to restrict, induce, or otherwise affect general land uses, but rather applies to the marsh crust regardless of any and all future land uses.

No impacts to existing or surrounding land uses or policies are anticipated. The property is currently residential, and is proposed to remain so. Cleanup goals under the proposed remedy are consistent with residential use.

8.2.4 *Risk of Upset*

The marsh crust is anticipated to lie 2 to 15 feet bgs. The contaminants in the marsh crust are not highly soluble. The proposed institutional controls are intended to minimize potential routes of exposure to the hazardous constituents in the marsh crust, and will not result in disruption of utilities. Although actions taken in violation of the covenant at the heart of this project could result in release of hazardous substances to the surface environment, such an outcome is considered to be unlikely. No physical change to the site will take place as a result of the proposed remedy of the RAW, therefore, risk of upset is insignificant.

8.2.5 *Potential Impacts to Public Health and Safety*

The HHRA conducted for the site concluded there is no risk to human health because no pathway exists for the contamination. The adoption of the RAW will not cause the contamination to be exposed. The proposed remedy would be effective in the long term because its implementation would become part of DTSC's ongoing governmental regulatory system.

The land-use covenant will be in the chain-of-title, which will put all future owners on notice. This type of recorded covenant has more "permanence" because the institutional control would reduce the probability that future occupants will excavate the marsh crust without taking proper precautions. Should the City of Alameda decide to change or eliminate the excavation ordinance, the covenant would require DTSC to approve any projects involving excavation into the marsh crust.

8.2.6 *Potential Cumulative Effects*

The cumulative impact of the adoption of the proposed RAW and the proposed development project on the site could result in impacts to human health from exposure to the marsh crust layer during excavation of the site in preparation for construction. These potential impacts would be mitigated by the covenant proposed as part of RAW, which requires approval from DTSC or the City of Alameda for the excavation of soil at the site. The permit would require controls on the management of soil excavated from the subsurface marsh crust layer to limit human exposure during construction activity at the site, and would reduce the potential impact to less than significant.

DTSC has conducted California Environmental Quality Act reviews for past site mitigation-related projects, which concluded that impacts associated with those projects were insignificant, both from an individual and cumulative perspective. The project analysis in this Initial Study also shows impacts to be insignificant when institutional controls are imposed. These controls would restrict any physical disturbance of soils within certain parameters to avoid significant impacts to human health and the environment.

DTSC also examined the Draft Environmental Impact Report for the Catellus Mixed Use Development Project that concluded future impacts associated with development of the subject site would also be insignificant when mitigation measures were imposed, including imposition of the mentioned institutional controls which limit human exposure to hazardous waste. As such, DTSC finds that cumulative impacts from this project when viewed against related past and future projects would be insignificant.

8.3 *RECOMMENDED REMEDIAL ALTERNATIVE*

For the marsh crust at the site, the comparative analysis indicates that Alternative 2, consisting of a combination of government controls and private property deed restrictions, provides overall protection of human health and the environment, meets the threshold criteria for remedy selection, and is cost-effective. Based on USEPA's determination that sites that require remediation only for the marsh crust are not on the NPL, DTSC believes that it is within our jurisdiction to conclude that this is the final remedy for this site. Alternative 1 may not be protective of public health and the environment during potential future construction activities. Although protective of human health and the environment, Alternatives 3 and 4 are potentially less effective in the short-term because of the disruption expected from such a large-scale excavation and either off-site disposal or on-site treatment. In addition, the costs for implementing Alternatives 3 and 4 are grossly excessive when compared to Alternatives 1 and 2. According to the NCP (40 CFR Subsection 430(e)(7)(iii)), "[c]osts that are grossly excessive compared to the overall effectiveness of alternatives may be considered as one of the several factors used to eliminate alternatives." Although this NCP provision is specifically directed to the screening of remedial alternatives, it is also relevant to the detailed analysis of alternatives under a RAW. Consideration of Alternatives 3 and 4 shows that they would provide no significantly greater effectiveness or improved implementability than Alternative 2 and at a grossly excessive cost. For these reasons, Alternative 2 is the recommended remedial alternative for this site.

8.4 *IMPLEMENTATION SCHEDULE*

A schedule for implementation of institutional controls will be coordinated with the City of Alameda.

8.5 *PUBLIC INVOLVEMENT*

DTSC published the Draft RAW and Administrative Record for public comment. The public comment period on the Draft RAW and Administrative Record ran from 21 March 2000 to 20 April 2000. The Administrative Record was made available for public review at the information repository at Alameda Point. The comments received and DTSC's response to those comments is attached to the Final RAW as an Appendix D.

Table 8-1 *Comparative Analysis of Remedial Alternatives*
Alameda Point East Housing Area

Evaluation Criteria	Remedial Alternatives			
	1 **No Action**	2 **Institutional Controls**	3 **Excavation and Off-Site Disposal**	4 **Excavation and On-Site Treatment with Thermal Desorption**
Overall Protection of Human Health	Not Protective	Protective	Protective	Protective
Compliance with ARARs	None	None	Complies	Complies
Long-Term Effectiveness and Permanence	Low	Moderate to highly effective	Highly effective	Highly effective
Reduction of Toxicity, Mobility, or Volume through Treatment	Low	Low	Low	Highly effective
Short-Term Effectiveness	Highly effective	Highly effective	Low	Low to moderately effective
Implementability	High	High	Low	Low
Cost (Present Worth)	**$0**	**$48,720**	**$131,429,129**	**$81,773,340**

Note:

ARAR Applicable or Relevant and Appropriate Requirement

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Appendix A
Marsh Crust and Ground Water Restrictive Land-Use Covenant

MARSH CRUST AND GROUND WATER RESTRICTIVE LAND-USE COVENANT

It is to be noted the following Marsh Crust and Ground water restrictive land-use covenant is a "proposed" document under development and is awaiting authorized signatures from the relevant parties. The covenant appears to have agreement among all relevant parties.

Recording Requested by:

City of Alameda
Economic Development Division
950 West Mall Square, #215
Alameda, CA 94501
Attn: Jeffrey T. Bond

When Recorded, Mail to:

Department of Toxic Substances Control
10151 Croydon Way, Suite 3
Sacramento, CA 95827-2106
Attention: A. J. Landis, P.E., Chief
Office of Military Facilities

COVENANT

TO RESTRICT USE OF PROPERTY

(ENVIRONMENTAL RESTRICTIONS)

Fleet and Industrial Supply Center, Oakland
Alameda Facility and Alameda Annex
and
Alameda Naval Air Station East Housing
Alameda, California

This Covenant To Restrict Use of Property ("Covenant") is made on the ____ day of _____, 2000 by the City of Alameda ("City" or "Covenantor"), which is the current owner of the property restricted by this Covenant, and the California Environmental Protection Agency - Department of Toxic Substances Control (the "Department" or "Covenantee").

RECITALS/STATEMENT OF FACTS

A. Covenantor is the owner of record of that certain real property consisting of approximately _____ acres (the "Property") situated in the City of Alameda, County of Alameda, State of California. The Property formerly was part of the United States Navy installation commonly known as the Fleet and Industrial Supply Center, Oakland, Alameda Facility and Alameda Annex and the adjacent part of the former Alameda Naval Air Station commonly known as East Housing. A legal description of the Property is set forth in Exhibit A and is incorporated herein by this reference. A figure depicting the location of the Property is set forth in Exhibit B and is incorporated herein by this reference.

B. The Property was formerly owned by the United States Navy.

C. The Navy has caused to be completed environmental response actions on and in connection with the Property. Such actions include, but are not limited to, preparation of a **[insert date and name of final remedial action document]** ("RAP/ROD") that has been approved by the Department, and the implementation of response actions pursuant to the RAP/ROD that allow the Property to be used without significant risk to human health and without significant potential for future environmental damage.

D. Pursuant to California Civil Code section 1471(c), the Department has determined that this Covenant is reasonably necessary to protect present or future human health and safety or the environment as a result of the potential presence of hazardous materials, as defined in California Health and Safety Code section 25260, in the marsh crust and the shallowest groundwater zone, as defined below, under the surface of land at the Property. The Department has also determined that such protection is part of the remedy contemplated in the RAP/ROD. The Covenantor and

the Department therefore intend that the use of the Property be restricted as set forth in this Covenant to protect human health, safety and the environment.

E. The Property is planned for mixed uses including residential use. Before 1920, the Property and surrounding areas were undeveloped tidal marsh along Alameda Island's San Francisco Bay shoreline. Between approximately 1900 and 1940, the Property and surrounding areas were filled with sand and clay material from unknown sources.

F. "Marsh crust" means the underground layer that is the remnant of the tidal marsh that existed along the shoreline of Alameda Island before filling to create additional dry land. In many places, this layer contains hazardous materials from former industrial discharges that were retained in the historic marsh before filling. These hazardous materials include petroleum hydrocarbons (TPH) and polynuclear aromatic hydrocarbons (PAHs). The marsh crust is a continuous underground layer, at depths of ___ to ___ feet from the surface, that extends bayward of the original mean higher high tide line of Alameda Island, before filling, throughout the area that was filled.

G. The "shallowest groundwater zone" is in the fill at the Property, is first encountered at depths from 4 to 8 feet below ground surface (bgs) and extends to a maximum depth of approximately 20 feet bgs. The shallowest groundwater zone does not include any deeper groundwater zone that is hydraulically separated from the fill. In particular, the shallowest groundwater zone does not include the "Merritt Sand" zone, which is first encountered at approximately 10 to 105 feet bgs and is hydraulically separated from the fill by Bay Mud, the thickness of which ranges from 5 to 95 feet at the Property. The shallowest groundwater zone is currently not usable for drinking water because of the presence of naturally occurring inorganic constituents (total dissolved solids and some metals). Because of this intrinsic use limitation of the

groundwater, the contamination of organic constituents (volatile organic compounds, TPH, and PAHs) related to former activities at or in the vicinity the Property, may, at this time, remain in place provided there are sufficient controls and restrictions to protect the public health, safety, and the environment.

ARTICLE I
ADDITIONAL DEFINITIONS

1.1 Occupant(s). "Occupant(s)" means any person or entity entitled by ownership, leasehold, or other legal relationship to occupy any portion of the Property.

1.2 Owner(s). "Owner(s)" means the Covenantor, its successors in interest and their successors in interest, including heirs and assigns, who at any time hold fee title to all or any portion of the Property.

1.3 Excavation ordinance. "Excavation ordinance" means City of Alameda Ordinance No. _____, a copy of the current version of which is attached as Exhibit C and incorporated herein by this reference.

1.4 Threshold depth. "Threshold depth" is the elevation above which there is little likelihood that hazardous materials from the marsh crust would have mixed during filling. The threshold depth for any location at the Property is shown on Exhibit __ to the RAP/ROD.

1.5 Permitted excavation. "Permitted excavation" means (i) excavation performed in accordance with a City permit approved and issued pursuant to the excavation ordinance when such permit is required under the terms of the excavation ordinance; or (ii) if the excavation ordinance has been repealed or the Department has made a written determination pursuant to subsection 3.2 that the excavation ordinance does not comport with the intent of this Covenant, excavation performed in accordance with a written approval issued by the Department.

1.6 Department. "Department" means the California Environmental Protection Agency, Department of Toxic Substances Control and its successor agencies, if any.

ARTICLE II
GENERAL PROVISIONS

2.1 Restrictions to Run with the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), subject to which the Property and every portion of the Property shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered and/or conveyed. Each and every Restriction: (a) runs with the land pursuant to California Health & Safety Code section 25355.5(a)(1)(C) and California Civil Code section 1471; (b) inures to the benefit of and passes with each and every portion of the Property; (c) is for the benefit of, and is enforceable by the Department; and (d) is imposed upon the entire Property unless expressly stated as applicable only to a specific portion of the Property.

2.2 Binding Upon Owners/Occupants. Pursuant to California Health & Safety Code section 25355.5(a)(1)(C), this Covenant binds all Owners and Occupants of the Property, and their heirs, successors and assignees, and their agents, employees, and lessees. Pursuant to California Civil Code section 1471(b), all Owners of the Property are expressly bound by this Covenant for the benefit of Covenantee.

2.3 Incorporation into Deeds and Leases. The Restrictions set forth in this Covenant shall be incorporated by reference in each and all deeds, leases and subleases of any portion of the Property.

2.4 Conveyance of Property. The Owner(s) shall provide a notice to the Department not later than thirty (30) days after any sale, lease or other conveyance of the Property or a real property estate in the Property (excluding mortgages, liens, and

other non-possessory encumbrances). The Department shall not, by these provisions, have authority to approve, disapprove, or otherwise affect any such sale, lease or other conveyance of the Property or estate except as otherwise provided by law, by administrative order, or by a specific provision of this Covenant.

2.5 Written Notification. Upon a determination that a hazardous substance is present upon or beneath nonresidential real property, a notification must be made pursuant to California Health & Safety Code section 25359.7. Specifically, prior to the sale or lease of nonresidential real property, the owner or lessor shall give the buyer or lessee notice that a hazardous substance is located on or beneath the Property.

ARTICLE III
RESTRICTIONS/ENFORCEMENT

3.1 Applicability. The provisions of this Article shall apply to the Property described in Exhibit A and shown on Exhibit B.

3.2 Prohibited Activities. The following activities are prohibited on the Property:

a. Construction of any water well screened for the extraction of water from the shallowest groundwater zone (as defined above) except as provided in this Covenant;

b. Extraction (except for necessary construction site dewatering), utilization or consumption of water from the shallowest groundwater zone for use other than irrigation or emergency use, e.g. firefighting;

c. Disposal of extracted groundwater from construction site dewatering into the waters of the state except in compliance with the requirements of the Regional Water Quality Control Board, San Francisco Bay Region; and

d. Engaging in any excavation below the threshold depth without a City excavation permit. If the excavation ordinance has been repealed, or if the

Department has made a written determination with thirty (30) days prior written notice to the City that the excavation ordinance does not comport with the intent of this Covenant, then a permitted excavation may be conducted only in accordance with a written approval issued by the Department. Covenantor's application for such an approval shall be submitted to the Department and shall otherwise comply with the permit application requirements of the last version of the excavation ordinance or such other requirements as the Department may specify.

3.3 Access For Department. The Department shall have a reasonable right of entry and access to the outdoor areas of the property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department to protect the public health or safety, or the environment.

3.4 Enforcement. Failure of the Covenantor, or Owner(s)/Occupant(s) to comply with any of the Restrictions specifically applicable to it shall be grounds for the Department to require that the Covenantor or Owner(s)/Occupant(s) remove any wells constructed or to close or otherwise remedy any excavation conducted in violation of the prohibited activities stated in subsection 3.2 of this Covenant. Violations of this Covenant shall be grounds for the Department to file civil or criminal actions as provided by law.

ARTICLE IV
VARIANCE AND TERMINATION

4.1 Variance. Covenantor or any other aggrieved person may apply to the Department for a written variance from the provisions of this Covenant. Such application shall be made in accordance with California Health & Safety Code section 25233.

4.2 Termination. Covenantor or any other aggrieved person may apply to the Department for a termination of some or all of the Restrictions as they apply to all or any portion of the Property. Such application shall be made in accordance with California Health & Safety Code section 25234.

4.3 Term. Unless terminated in accordance with subsection 4.2 above, by law or by the Department in the exercise of its discretion, this Covenant shall continue in effect in perpetuity.

ARTICLE V
MISCELLANEOUS

5.1 No Dedication Intended. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property or any portion of the Property to the general public or anyone else for any purpose whatsoever.

5.2 Department References. All references to the Department include successor agencies/departments or other successor entity.

5.2 Notices. Whenever any person gives or serves any notice, demand, or other communication with respect to this Covenant, each such notice, demand, or other communication shall be in writing and shall be deemed effective (i) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served or official of a government agency being served, or, (ii) three (3) business days after deposit in the mail if mailed by United States mail, postage paid and certified, return receipt requested:

To: "Covenantor":
City of Alameda
Economic Development Division
950 West Mall Square, #215
Alameda, CA 94501
Attention: Jeffrey T. Bond

To: "Department":
Department of Toxic Substances Control
10151 Croydon Way, Suite 3
Sacramento, CA 95827-2106
Attention: A. J. Landis, P.E., Chief
Office of Military Facilities

Any party may change its address or the individual to whose attention a notice is to be sent by giving notice in compliance with this paragraph.

5.3 Partial Invalidity. If any portion of the Restrictions or terms set forth in this Covenant is determined by a court of competent jurisdiction to be invalid for any reason, the remaining portion shall remain in full force and effect as if such portion found invalid had not been included in this Covenant.

5.4 Article Headings. Headings at the beginning of each numbered article of this Covenant are solely for the convenience of the parties and are not a part of the Covenant.

5.5 Recordation. This instrument shall be executed by the Covenantor and by the Northern California Coastal Cleanup Operations Branch Chief, California Department of Toxic Substances Control. This instrument, with all referenced Exhibits, shall be recorded by the Covenantor in the County of Alameda within fifteen (15) days of the date of execution by both parties.

5.6 Statutory References. All statutory references include successor provisions.

5.7 Representative Authority. The undersigned representative of each party to this Covenant certifies that he or she is fully authorized to enter into this Covenant and to execute and legally bind that party to this Covenant.

IN WITNESS WHEREOF, the parties execute this Covenant as of the date set forth above.

OWNER: City of Alameda

By: _____

Title:

Date: _____

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

By: _____

Anthony J. Landis, P.E.

Title: Chief, Office of Military Facilities

Date: _____

STATE OF CALIFORNIA)
)
COUNTY OF)

On _____, 1999 before me, a Notary Public in and for State of California, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that she/he executed the same in his authorized capacity, and that by her/his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

_____

Notary's Signature

STATE OF CALIFORNIA)
)
COUNTY OF _____)

On _____, 1999 before me, a Notary Public in and for State of California, personally appeared Anthony J. Landis, personally known to me or proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that she executed the same in her authorized capacity, and that by her signature on the instrument, the Department of Toxic Substances Control executed the instrument.

WITNESS my hand and official seal.

_____

Notary's Signature

Appendix B

City of Alameda Marsh Crust

Excavation Ordinance

CITY OF ALAMEDA ORDINANCE NO. ____
New Series

AMENDING THE ALAMEDA MUNICIPAL CODE BY AMENDING CHAPTER XIII (BUILDING AND HOUSING) BY ADDING A NEW SECTION 13-56 (EXCAVATION INTO THE MARSH CRUST/SUBTIDAL ZONE AT THE FORMER NAVAL AIR STATION ALAMEDA AND FLEET INDUSTRIAL SUPPLY CENTER, ALAMEDA ANNEX AND FACILITY) TO ARTICLE XVII (PITS, WELLS AND EXCAVATIONS)

WHEREAS, the marshlands and near shore areas once located adjacent to the island of Alameda were filled with dredge material between approximately 1900 and 1940; and

WHEREAS, the marsh crust, and the subtidal zone extending from it, is a horizon that is identifiable in the subsurface (the interface at the bottom of the fill material) which contains remnants of grasses and other intertidal and subtidal features; and

WHEREAS, the marsh crust/subtidal zone also contains, at least locally, elevated levels of petroleum-related substances, such as semi-volatile organic compounds, which substances may pose an unacceptable risk to human health and the environment if excavated in marsh crust/subtidal zone materials, brought to the ground surface and handled in an uncontrolled manner; and

WHEREAS, proper handling, storage and disposal of materials excavated from the marsh crust/subtidal zone, pursuant to state and federal hazardous materials laws, will help eliminate unacceptable exposures and risks to human health and the environment; and

WHEREAS, the Draft Base-wide Focused Feasibility Study for the Former Subtidal Area and Marsh Crust and Ground Water (U.S. Navy, February 20, 1999) recommends implementation by the City of an institutional control, such as an excavation ordinance, as a remedial action related to the cleanup by the United States Navy of Naval Air Station Alameda and the Fleet Industrial Supply Center, Alameda Annex and Facility, which closed military installations are anticipated to be transferred to the City; and

WHEREAS, it can be seen with a certainty that adoption of a permitting program by the City that requires proper handling, storage and disposal, pursuant to existing state and federal hazardous materials laws, of materials excavated from the marsh crust/subtidal zone will not involve or require any physical activities other than optional testing of excavated materials and, therefore, is exempt from the California Environmental Quality Act pursuant to California Code of Regulations, title 14, section 15061(b)(3) because there is no possibility that the enactment of the ordinance may have a significant effect on the environment.

NOW, THEREFORE, BE IT ORDAINED by the Council of the City of Alameda that:

Section 1. The Alameda Municipal Code is hereby amended by adding a new Section 13-56 (Excavation Into the Marsh Crust/Subtidal Zone at the Former Naval Air Station Alameda and Fleet Industrial Supply Center) to Article XVII (Pits, Wells and Excavations) of Chapter XIII (Building and Housing) thereof to read:

13-56 EXCAVATION INTO THE MARSH CRUST/SUBTIDAL ZONE AT THE FORMER NAVAL AIR STATION ALAMEDA AND FLEET INDUSTRIAL SUPPLY CENTER, ALAMEDA ANNEX AND FACILITY.

13-56.1 DEFINITIONS.

For purposes of this Section 13-56 the following definitions shall apply:

Bay shall mean San Francisco Bay, including the Oakland Estuary and the Oakland Inner Harbor.

DTSC shall mean the California Environmental Protection Agency, Department of Toxic Substances Control.

Earth material shall mean any rock, natural soil or fill or any combination thereof.

Excavation shall mean the mechanical removal of earth material.

Hazardous materials, as defined in California Health and Safety Code sections 25260(d) and 25501(k), shall mean any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant or potential hazard to human health and safety, or to the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste and any material which a handler or the administering agency has reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.

Marsh crust shall mean the underground layer that is the remnant of the tidal marsh that existed along the shoreline of Alameda Island before filling to create additional dry land. In many places, this layer contains substances from former industrial discharges that were retained in the historic marsh before filling.

Subtidal zone shall mean the underground layer that is the pre-filling Bay floor extension of the historic marsh. Together, the marsh crust and the subtidal zone constitute a single, continuous, underground layer that extends Bayward of the original mean higher high tide line of Alameda Island, before filling, throughout the area that was filled.

Threshold depth shall mean the depth below which a permit is required by this Section 13-56. The threshold depth is conservatively identified with the elevation above which there is little likelihood that substances from the historic marsh or Bay floor would have mixed during filling, including a margin of safety above the elevation of the historic marsh surface or subtidal zone. In no event will the threshold depth be above mean higher high water.

13-56.2 Permit Required.

a. It shall be unlawful for any person, including utility companies and their employees and contractors, to excavate below a threshold depth above the marsh crust/subtidal zone within the area of the former Naval Air Station Alameda and Fleet and Industrial Supply Center, Alameda Annex and Facility, as depicted in Exhibit A, hereto, without first obtaining a permit in writing from the Chief Building Official.

b. All excavation below the threshold depth in the area subject to this Section 13-56 shall be performed solely in accordance with the permit as approved and issued by the City.

13-56.3 Depth of Excavation Subject to Permit Requirement.

The Chief Building Official shall establish a threshold depth, consistent with DTSC's remedial decision documents pertaining to the marsh crust/subtidal zone, below which a permit shall be required for excavation pursuant to this Section 13-56. The threshold depth may vary by location. The Chief Building Official shall publish a map depicting the parcels and threshold depths for which a permit is required under this Section 13-56. The Chief Building Official may update the map, consistent with DTSC's remedial decision documents pertaining to the marsh crust/subtidal zone, as necessary to incorporate any new information concerning the depth of the marsh crust/subtidal zone received by the City since the preparation of the initial map or last update.

13-56.4 Exception to Permit Requirement.

1. No permit shall be required under this Section 13-56 for pile driving or other penetration of the marsh crust/subtidal zone that involves neither (i) bringing materials from below the threshold depth to above the threshold depth; nor (ii) exposure of construction workers to soil excavated from below the threshold depth.

2. No permit shall be required under this Section 13-56 for excavation associated with emergency repair of public infrastructure facilities; provided, however, that soil excavated from below the threshold depth in the area of the marsh crust/subtidal zone, as depicted on Exhibit A, must be managed as though it were hazardous in accordance with Subsection 13-56.8b.

13-56.5 Permit Application.

Application for a permit shall be made in writing on forms available in or from the Building Services Office and shall be filed in the Building Services Office. Subsection 13-1.2 of Article I of Chapter XXIII regarding Appeals (Section 105.1), Appeal Fee (Section 105.2), Expiration (Section 106.4.4), Permit Fees (Section 107.2) and Plan Review Fees (Section 107.3) shall apply to all permits issued pursuant to this Section 13-56. The information required to be provided on the application shall be determined by the Chief Building Official and shall include at a minimum:

a. A description and map of the property that is to be excavated sufficient to locate the area of proposed excavation on Exhibit A.

b Detailed plans, prepared by a registered civil engineer licensed in the State of California, of the excavation work to be done, including a drawing with dimensions to scale of all proposed excavation activity.

3. A statement of the maximum depth of excavation.

4. All elevations in plans and application materials submitted to the City shall be referenced to City Datum and shall show depth below ground surface.

5. A cost estimate for purposes of determining the amount of the bond required to be obtained pursuant to Subsection 13-56.11.

13-56.6 Certifications and Acknowledgments.

a. The following certifications shall be required as part of the permit application:

1. The applicant shall sign a certification prepared by the Chief Building Official acknowledging receipt of notice that the property to be excavated may be in the area of the marsh crust/subtidal zone, and that hazardous materials may be encountered during excavation.

2. The applicant shall sign a certification prepared by the Chief Building Official acknowledging that federal and state hazardous materials laws and regulations will apply to storage, transportation and disposal of any materials excavated from the marsh crust/subtidal zone that are hazardous materials.

3. The applicant shall sign a certification prepared by the Chief Building Official acknowledging liability for disturbing and removing all materials from the marsh crust/subtidal zone in accordance with this Section 13-56 and the permit.

b. All building and excavation permits issued for construction or excavation within the area subject to this SubSection 13-56 shall contain the following written warning:

"Pursuant to Section 13-56 of Article XVII of Chapter XIII of the Alameda Municipal Code, excavation work in the area of the marsh crust/subtidal zone within the area of the former Naval Air Station Alameda and Fleet and Industrial Supply Center, Alameda Annex and Facility, as depicted in Exhibit A to Section 13-56 of Article XVII of Chapter XIII of the Alameda Municipal Code, may be subject to special materials handling requirements. The permittee acknowledges that he or she has been informed of the special materials handling requirements of Section 13-56 of Article XVII of Chapter XIII of the Alameda Municipal Code and that hazardous materials may be encountered during excavation."

13-56.7 Notification Prior to Start of Excavation.

a. After receipt of a permit and no less than two (2) business days (forty-eight (48) hours minimum) before commencement of any excavation activity in the area subject to this Section 13-56, the permittee shall notify the Chief Building Official of the planned start of excavation. Said notification shall include a schedule for any excavation work that will last for more than one day.

b. The permittee shall give adequate notice to Underground Service Alert prior to commencing any excavation activity subject to this Section 13-56.

13-56.8 Materials Handling.

The permittee shall elect to follow one or more of the courses of action set forth below before beginning any excavation activities in the area subject to this Section 13-56. Unless otherwise demonstrated by the permittee by means of reconnaissance investigation pursuant to Subsection 13-56.8a, or unless the permittee prepares site management plans pursuant to Subsection 13-56.8c, soil below the threshold depth in the area of the marsh crust/subtidal zone, as depicted on Exhibit A, must be managed as though it were hazardous pursuant to Subsection 13-56.8b. The permittee may elect to follow Subsection 13-56.8a, but must comply with Subsection 13-56.8b or 13-56.8c if testing demonstrates that the materials below the threshold depth are hazardous materials. Copies of all reconnaissance testing results and/or existing information used to satisfy the reconnaissance investigation requirements of Subsection 13-56.8a shall be reported to and filed with the City. All observations or encounters with the marsh crust/subtidal zone during excavation shall be reported to the City.

a. Reconnaissance Investigation to Rule Out the Presence of Hazardous Materials Below the Threshold Depth.

The permittee may elect to use reconnaissance borings, pursuant to a plan prepared by a qualified registered engineer or registered geologist, licensed in the State of California, to rule out, to the satisfaction of the Chief Building Official, the presence of hazardous materials below the threshold depth in the area to be excavated. As part or all of the reconnaissance plan, the permittee may make use of existing information, where appropriate, if the existing information is directly relevant to the location and depth to be excavated and contains observations or results of analyses that assist in concluding whether hazardous materials are present. The reconnaissance report shall include a description of all observations from below the threshold depth evidencing the presence or absence of the marsh crust/subtidal zone.

1. If hazardous materials are found below the threshold depth within the area to be excavated at any time (during reconnaissance or during excavation), the permittee shall comply with either Subsection 13-56.8b or Subsection 13-56.8c, at his or her election.

2. If hazardous materials are not found below the threshold depth within the area to be excavated, no additional materials controls, except as otherwise may be required under applicable federal, state or local law, are required under this Section 13-56.

b. Handling Materials Excavated From Below the Threshold Depth as Hazardous Materials.

If the permittee has not ruled out the presence of hazardous materials pursuant to Subsection 13-56.8a, or elects not to prepare a site management plan and materials testing program pursuant to Subsection 13-56.8c, the permittee shall presume that materials excavated from below the threshold depth must be disposed at an appropriately permitted disposal facility. In addition, no excavated materials from below the threshold depth may be stockpiled prior to disposal or returned to the excavation.

c. Preparation of Construction Site Management Plan for Handling Materials Excavated From Below the Threshold Depth.

1. In lieu of handling materials excavated from below the threshold depth pursuant to the restrictions in Subsection 13-56.8b, the permittee may elect to hire a qualified registered engineer or registered geologist, licensed in the State of California, to develop a site-specific construction site management plan, including a materials testing program, to the satisfaction of the Chief Building Official. The construction site management plan shall include, at a minimum, provisions governing control of precipitation run on and run off from stockpiled soils, soil segregation, securing of stockpiled soils, duration of stockpiling, and contingency plans for handling materials excavated from below the threshold depth that prove to be hazardous materials.

2. The permittee shall hire a qualified registered engineer or registered geologist, licensed in the State of California, to oversee compliance with the approved construction site management plan, and shall transmit to the Chief Building Official upon completion of the project written certification of compliance with the construction site management plan. The certification report shall include a description of all observations from below the threshold depth evidencing the presence or absence of the marsh crust/subtidal zone.

13-56.9 Health and Safety Plan.

The applicant shall cause to be prepared by a certified industrial hygienist, and keep on the construction site at all times, a health and safety plan to protect workers at the excavation site and the general public to the satisfaction of the Chief Building Official. The Chief Building Official may prepare and provide to applicants a model health and safety plan which, if used by the applicant, shall be modified by the applicant's certified industrial hygienist to suit the specific requirements of the applicant's project.

13-56.10 Excavation Site Best Management Practices.

All excavation and materials handling activities permitted under this Section 13-56 shall be conducted in accordance with applicable Alameda Countywide Clean Water Program Best Management Practices and City of Alameda Storm Water Management and Discharge Control Program Ordinance requirements.

13-56.11 Bonds.

Upon a finding by the Chief Building Official that a permit should issue for excavation pursuant to this Section 13-56, a surety or performance bond conditioned upon the faithful performance and completion of the permitted excavation activity shall be filed with the City. Such bond shall be executed in favor of the City and shall be maintained in such form and amounts prescribed by the Risk Manager sufficient to ensure that the work, if not completed in accordance with the approved plans and specifications, will be corrected to eliminate hazardous conditions.

13-56.12 Nonassumption of Liability.

In undertaking to require applicants for certain excavation permits to comply with the requirements of this Section 13-56, the City of Alameda is assuming an undertaking only to promote the general welfare. The City is not assuming, nor is it imposing on itself or on its officers and employees, an obligation for breach of which it is liable in money damages to any person who claims that such breach proximately caused injury.

13-56.13 Construction on City Property.

a. The Chief Building Official shall prepare standard work procedures that comply with all the requirements of this Section 13-56 for all City

construction or improvement activities involving excavation below the threshold depth in the area subject to this Section 13-56. All departments, boards, commissions, bureaus and agencies of the City of Alameda that conduct construction or improvements on land under their jurisdiction involving excavation below the threshold depth in the area subject to this Section 13-56 shall follow such standard work procedures.

b. The City shall include in all contracts involving excavation below the threshold depth in the area subject to this Section 13-56 a provision requiring City contractors to comply with all the requirements of this Section 13-56. All contracts entered into by departments, boards, commissions, bureaus and agencies of the City of Alameda that authorize construction or improvements on land under their jurisdiction involving excavation below the threshold depth in the area subject to this Section 13-56 also shall contain such standard contract provision.

13-56.14 Severability.

If any section, subsection, subdivision, paragraph, sentence, clause or phrase of this Section 13-56 or any part thereof is for any reason held to be unconstitutional or invalid or ineffective by any court of competent jurisdiction, such decision shall not affect the validity or effectiveness of the remaining portions of this Section 13-56 or any part thereof. The City Council hereby declares that it would have passed each section, subsection, subdivision, paragraph, sentence, clause or phrase of this Section 13-56 irrespective of the fact that one or more sections, subsections, subdivisions, paragraphs, sentences, clauses or phrases be declared unconstitutional or invalid or effective.

13-56.15 Permit Fee.

No permits for excavation in the marsh crust/subtidal zone shall be issued unless a fee has been paid. The fee shall be set by City Council resolution.

13-56.16 Penalties.

a. Any person, including utility companies and their employees and contractors, violating any of the provisions of this Section 13-56 shall be deemed guilty of a misdemeanor, and each person shall be deemed guilty of a separate offense for each and every day or portion thereof during which any violation of any of the provisions of this Section 13-56 is committed, continued or permitted, and such violation may be prosecuted and punished as an infraction or misdemeanor pursuant to the provisions of Section 1-5.1 of the Alameda Municipal Code .

b. Any person, including utility companies and their employees and contractors, that commences any excavation without first obtaining the necessary permits therefor shall, if subsequently allowed to obtain a permit, pay an amount, in

addition to the ordinary permit fee required, quadruple the permit fee otherwise required.

13-56.17 Retention and Availability of Permit Files

The City shall maintain files pertaining to all permits issued under this Section 13-56, and shall make such files available to DTSC for inspection upon request during normal business hours.

13-56.18 Amendment of Section 13-56

This Section 13-56 shall not be repealed or amended without thirty (30) days prior written notice to the DTSC Deputy Director for Site Mitigation.

Section 2. This Ordinance shall be in full force and effect from and after the expiration of thirty (30) days from the date of its final passage.

_____
Presiding Officer of the City Council

Attest:

_____
City Clerk

* * * * * *

I, the undersigned, hereby certify that the foregoing Ordinance was duly and regularly adopted and passed by the Council of the City of Alameda in regular meeting assembled on the _____ day of _____, 2000, by the following vote to wit:

AYES:

NOES:

ABSENT:

ABSTENTIONS:

IN WITNESS, WHEREOF, I have hereunto set my hand and affixed the official seal of said City this _____ day of _____, of 2000.

_____

Diane B. Felsch, City Clerk
City of Alameda

CAD File: G:\3421.00\3421001\4.dwg
Drawn By: D. Ludlam
Date: 03/20/00
Project No. 3421.00

PARCEL 171

PARCEL 170

Legend:

EH-13 February 2000 Ground Water Grab Sample Locations

EH-6 Direct Push Soil Sampling Location

TR-6 Geotechnical Boring

Potential Depth to Marsh Crust Threshold (Mean Higher High Tide)

0 250
FEET

* Sediments Consistent with Marsh Crust (Unconaminated) Found at 9.5 ft bgs at this Location

Figure B-1
Depth to Potential Marsh Crust Threshold
Alameda Point East Housing Area
Alameda Annex Site
Alameda, California
ERM 03/00

Appendix C
Cost Estimate for Marsh Crust Remedial Alternatives

INTRODUCTION

This cost estimate has two components: (1) cost estimate summaries, and (2) facts and assumptions. The costs are based on those presented in the Final Feasibility Study for FISCO Alameda, taking into account the facts and assumptions for the site and for FISCO.

SITE COST ESTIMATES, FACTS AND ASSUMPTIONS

Cost information is presented in Tables C-1 through C-7. Tables C-1 through C-3 summarize cost items and quantities used to estimate total costs for marsh crust Alternatives 2 through 4. Alternative 1 (no action) does not require a cost estimate. Tables C-4 through C-6 detail the items and quantities used to calculate the costs for sampling (conducting a site-wide sampling effort to define the full extent of the marsh crust); demolition (demolishing all structures at the site prior to remedial actions); and excavation, hauling, stockpiling, and backfilling (the operations required to physically remove the overburden material and the marsh crust). Table C-7 provides a list of the correction factors used to adjust costs from the sources consulted.

The second component provides the basic facts and assumptions that are common to all the cost estimates for the marsh crust removal alternatives (Alternatives 3 and 4); they are presented in Tables C-8 through C-10. Table C-8 provides the estimate of overburden soil and contaminated soil volumes. Table C-9 lists the assumptions regarding the types of buildings that exist at the site and their total square footage. These assumptions are based on the estimations of proportions of buildings types present at FISCO Alameda and are used to estimate demolition costs. Table C-10 is a list of unit conversion factors used in the estimates.

Unit costs were assumed to be the same as those documented in the Final FS, except where noted on the tables. For certain tasks, it was necessary to recalculate the unit costs based on those presented in the Final FS for FISCO. The costs of these tasks are assumed to be directly dependent on the area of the facility. Because the area of the site (63.1 acres) is approximately 0.441 times the area of FISCO Alameda (143 acres), the unit costs for these tasks presented in the Final FS for FISCO Alameda were multiplied by 0.441 to determine the appropriate unit costs for the site.

Cost evaluation for remedial alternatives did not include a present worth analysis due to the relatively short duration for all alternatives. The term for implementation of each of the alternatives is less than 3 years, with presumably low inflation that would not appreciably affect costs.

COSTS FOR REMEDIAL ALTERNATIVES

Remediation costs were determined for the site area based on the following alternatives:

- Alternative 2: Institutional Controls;
- Alternative 3: Excavation and Off-Site Disposal; and
- Alternative 4: Excavation and On-Site Treatment with Thermal Desorption.

Alternative 1, no action, remains at zero cost.

Alternative 2

The estimated cost of Alternative 2 is assumed to be independent of the area of the site. Institutional controls involve administrative and legal procedures that can be done for the same cost whether the area is 63.1 acres (site) or 143 acres (FISCO Alameda). Therefore, the cost for Alternative 2 is the same as the cost for Alternative 2 for FISCO Alameda presented in the Final FS.

Alternatives 3 and 4

The common tasks in Alternatives 3 and 4 that were developed for the site are:

- Task 1.1: Sampling of marsh crust (to delineate the area requiring remediation);
- Task 1.2: Demolition and disposal; and
- Task 1.3: Excavation of marsh crust, hauling to stockpiles, stockpiling, and backfilling clean overburden.

The costs for these tasks are presented in Tables C-4 through C-6. These costs are assumed to apply to both Alternatives 3 and 4. The task of backfilling the volume of contaminated soil is not included in Task 1.3, but

is included on the summary tables for the two alternatives (Table C-2 for Alternative 3 and Table C-3 for Alternative 4).

The following table presents the assumptions used in the calculations:

Table 1 ***Marsh Crust and Ground Water Depth Parameters***

Parameter	Site	FISCO Alameda
Depth (ft bgs) to top of the former subtidal area and marsh crust	8	15
Thickness (ft) of the former subtidal area and marsh crust layer	1.5	1.5
Average depth to ground water (ft bgs)	5	5

ft bgs: feet below ground surface

Due to the proximity of the site to FISCO Alameda, the assumptions used for potential thickness of the marsh crust layer and average depth to ground water at the site are the same as those for FISCO Alameda. While the average depth of the marsh crust within the East Housing Area site alone has not been calculated, the average depth within Alameda Point as a whole is approximately 8 feet, with a range of 4 to 10 feet. Based on the proximity of the East Housing Area to the former shoreline (prior to filling of the island), it is anticipated that the approximate depth to marsh crust (if it is present) in this area would be generally consistent with that estimated for the remainder of Alameda Point (i.e., about 8 feet bgs).

For the line item of "Dewatering Excavation and Water Treatment" on Table B-6, the following methodology was used. For pumping costs, a quantity of 19 million gallons was determined for the site. This was calculated by first multiplying 63.1 acres by the depth of water in the excavation when completed to 9.5 feet bgs (4.5 feet given that the top of ground water table is assumed to be 5 feet bgs). This value was multiplied by 0.2, the assumed porosity of the soil (fraction of excavated soil volume that holds water) and a conversion factor. It is assumed that the sheet piling around the site is watertight and that no additional water enters the excavation (saltwater seepage intrusion factors were found to add negligible quantities of water). The quantity of 19 million gallons was multiplied by the cost of $20,000 per million gallons to get the extended cost value for each alternative.

Indirect Capital Costs for All Alternatives

Indirect capital costs include:

- Engineering costs;
- Project management and administration; and
- Legal, license, and permits.

These items are calculated as a percentage of direct costs, and are included in the cost estimates for each alternative.

Total Costs of Alternatives for the Site

The total cost of each alternative includes the sum of the capital costs plus a 5 percent contingency allowance on the sum. The total cost for Alternatives 2 through 4 are shown in Tables C-1 through C-3.

Table C-1

Alternative 2 - Institutional Controls, Marsh Crust
Alameda Point East Housing Area

Task	Description	Unit	Unit Cost ($) Labor	Equip.	Materials	Quantity	Extended Cost ($)[1]	Task Total ($)
1	**Direct Costs**							
1.1	**Institutional Controls (IC)**							
1.1.1	Drafting IC (engineering judgement)	LS				1	10,000	10,000
1.1.2	5-year review (6 events), $5,000/event	LS				1	30,000	30,000
							Direct Capital Costs	**40,000**
2	**Indirect Costs**							
2.1	Project Management and administration	15%					6,000	6,000
2.2	Legal, license, and permit costs	1%					400	400
							Indirect Capital Costs	**6,400**
							Administrative Costs Subtotal	**46,400**
3	**Contingency Allowances**	5%						**2320**
4	**Administrative Costs Total**							**48,720**

Notes:

1 Extended cost includes adjustment factors listed on Table C-7
LS Lump Sum
Unit costs are the same as those presented in the Draft Final Feasibility Study for FISCO Alameda, except where noted.

Table C-2

Alternative 3 - Excavation and Off-Site Disposal, Marsh Crust
Alameda Point East Housing Area

Task	Description	Unit	Unit Cost($) Labor	Equip.	Materials	Quantity	Extended Cost ($)[1]	Task Total ($)
1	**Direct Capital Costs**							
1.1	**Sampling of Marsh Crust Direct Capital Costs (see Table C-4)**							**296,102**
1.2	**Demolition Direct Capital Costs (see Table C-5)**							**23,511,277**
1.3	**Excavation and Backfill (Volume of Clean Overburden) Direct Capital Costs (See Table C-6)**							**7,559,682**
1.4	**Haul to Landfill**							
1.4.1	Soil from 8 to 9.5 feet bgs hauled 200 miles round trip to landfill (RACER 33.19.96.01)	cy	1.15	1.10	28.64	198,513	6,132,054	**6,132,054**
1.5	**Landfill Dump Fee**							
1.5.1	Dump charge (ECHOS 33 19 7265)	cy			304	198,513	60,347,830	**60,347,830**
1.6	**Import and Backfill Volume of Contaminated Soil**							
1.6.1	Import, backfill, and compact unclassified fill (RACER 33.03.98.03)	cy	1.31	1.44	4.78	198,513	1,494,800	**1,494,800**
							Direct Capital Total Costs	**99,341,745**
2	**Indirect Capital Costs**							
2.1	Engineering costs	10%					9,934,175	
2.2	Project management and administration	15%					14,901,262	
2.3	Legal, license, and permit costs	1%					993,417	
							Indirect Capital Total Costs	**25,828,854**
							Capital Subtotal Costs	**125,170,599**
3	**Contingency Allowances**	5%						**6,258,530**
4	**Capital Costs Total**							**131,429,129**

Notes:

1 Extended cost includes adjustment factors listed on Table C-7
bgs Below ground surface
cy Cubic yards
ECHOS Environmental Cost Handling Options and Solutions Unit Cost Book (R.S. Means Company and Delta Technologies Group, Inc. 1997)
RACER Remedial Action Cost Engineering and Requirements (Delta Technologies Group, Inc. 1997)
Unit costs are the same as those presented in the Draft Final Feasibility Study for FISCO Alameda, except where noted.

Table C-3

Alternative 4 - Excavation and On-Site Treatment by Thermal Desorption, Marsh Crust
Alameda Point East Housing Area

Task	Description	Unit	Unit Cost($) Labor	Equip.	Materials	Quantity	Extended Cost ($)[1]	Task Total ($)
1	**Direct Capital Costs**							
1.1	**Sampling of Marsh Crust Direct Capital Costs (see Table C-4)**							**296,102**
1.2	**Demolition Direct Capital Costs (see Table C-5)**							**23,511,277**
1.3	**Excavation and Backfill (Volume of Clean Overburden) Direct Capital Costs (See Table C-6)**							**7,559,682**
1.4	**On-Site Thermal Desorption**							
1.4.1	Indirect fire thermal desorption all-inclusive for 198,513 cy (RACER 33.14.02.01)	LS	1,056,225 †	259,976 †	28,579,852 †	1	29,896,053	**29,896,053**
1.5	**Backfill Volume of Contaminated Soil**							
1.5.1	Backfill and Compact Treated Marsh Crust Soil (RACER 33.03.98.03)	cy	1.31	1.44		198,513	545,911	**545,911**
							Direct Capital Total Costs	**61,809,025**
2	**Indirect Capital Costs**							
2.1	Engineering costs	10%					6,180,902	
2.2	Project management and administration	15%					9,271,354	
2.3	Legal, license, and permit costs	1%					618,090	
							Indirect Capital Total Costs	**16,070,346**
							Capital Subtotal Costs	**77,879,371**
3	**Contingency Allowances**	5%						**3,893,969**
4	**Capital Costs Total**							**81,773,340**

Notes:

1 Extended cost includes adjustment factors listed on Table C-7
cy Cubic yards
LS Lump sum
RACER Remedial Action Cost Engineering and Requirements (Delta Technologies Group, Inc. 1997)
Unit costs are the same as those presented in the Draft Final Feasibility Study for FISCO Alameda, except where noted.
† Unit costs are calculated by multiplying unit costs presented in the Draft Final Feasibility Study for FISCO Alameda by the ratio of the areas of the sites (63.1/143).

Table C-4

Sampling of Marsh Crust
Alameda Point East Housing Area

Task	Description	Unit	Unit Cost($) Labor	Equip.	Materials	Quantity	Extended Cost ($)[1]	Task Total ($)
1	**Direct Capital Costs**							
1.1	**Planning Documents**							
1.1.1	Planning and Sampling and Analysis Plan (RACER 05.06.01-.02)	LS	4,019		9	1	4,028	
1.1.2	Health and Safety Plan (RACER 05.06.03)	LS	1,752		9	1	1,761	
1.1.3	Investigation-Derived Waste Plan (RACER 05.06.04)	LS	2,243		9	1	2,252	
1.1.4	Data Validation and Reporting (RACER 05.08.01-.03)	LS	6,674		9	1	6,683	
								14,724
1.2	**Mobilization/Demobilization**							
1.2.1	Two-Person Sampling and Crew, Local (RACER 05.11.08)	LS			382	1	382	
1.2.2	Drill Rig and Crew (RACER 33.23.11.01)	LS	537 †	389 †		1	926	
								1,308
1.3	**Decontamination Facility (300 square feet)**							
1.3.1	Capital Costs (RACER 33.17.98.01)	LS	1,675	132	5,698	1	7,505	
1.3.2	Operation Costs for 6 Months (RACER 33.17.98.99)	LS	14,859	61	3,069	1	17,989	
								25,494
1.4	**Field Sampling and Analysis Costs**							
1.4.1	Field set up to collect 310 samples (with QC = 420 samples) and subsurface sampling with split spoon sampler (RACER 05.07.01 and 05.11.06)	LS	64,478 †		17,527 †	1	82,005	
1.4.2	Drilling to 11 feet bgs, 310 samples (RACER 33.23.11.01)	LS	27,779 †	11,401 †	51,071 †	1	90,251	
1.4.3	Analytical costs for PAH USEPA SW 8310 (CostPro)	LS			196	420	82,320	
								254,576
					Total Direct Capital Costs			**296,102**

Table C-4

Sampling of Marsh Crust
Alameda Point East Housing Area

Notes:

1	Extended cost includes adjustment factors listed on Table C-7
bgs	Below ground surface
CostPro	CostPro Closure and Post-Closure Estimating Software Users Manual (Tetra Tech EM, Inc. 1997)
USEPA	U.S. Environmental Protection Agency
LS	Lump sum
PAH	Polycyclic Aromatic Hydrocarbon
QC	Quality control
RACER	Remedial Action Cost Engineering and Requirements (Delta Technologies Group, Inc. 1997)
SW	Solid waste

Unit costs are the same as those presented in the Draft Final Feasibility Study for FISCO Alameda, except where noted.

†	Unit costs are calculated by multiplying unit costs presented in the Draft Final Feasibility Study for FISCO Alameda by the ratio of the areas of the sites (63.1/143).

Table C-5

Demolition

Alameda Point East Housing Area

Task	Description	Unit	Unit Cost($) Labor	Equip.	Materials	Quantity	Extended Cost ($)[1]	Task Total ($)
1	**Direct Capital Costs**							
1.1	**Demolish, Haul, and Dispose of Buildings (non-explosive)**							
1.1.1	Demolition, Single and Multi-level Wood (ECHOS 17 02 0108)	ft^2	0.07	0.07		2,048,445	286,782	
1.1.1.1	Haul, 50 Miles One Way (RACER 33.03.77 based on 100,000 ft^2)	100,000 ft^2	171,316	268,210		20.48	9,001,492	
1.1.1.2	Load and Dump Charge (ECHOS 17 02 0409) (0.0320 cy/cf - RACER 33.03.77)	cy	5.65	7.50		786,603	10,343,828	
								19,632,103
1.1.2	Demolition, Multi-level Steel (ECHOS 17 02 0101)	ft^2	0.04	0.03		493,601	34,552	
1.1.2.1	Haul, 50 Miles One-way (RACER 33.03.77 based on 100,000 ft^2)	100,000 ft^2	171,316	288,348		4.94	2,270,740	
1.1.2.2	Load and Dump Charge (ECHOS 17 02 0409) (0.0339 cy/cf - RACER 33.03.77)	cy	3.24	4.31		200,797	1,516,017	
								3,821,309
1.1.3	Demolition, Single-level Masonry (ECHOS 17 02 0107)	ft^2	0.07	0.07		12,340	1,728	
1.1.3.1	Load and Haul, 50 Miles One-way (RACER 33.03.77 based on 12,340 ft^2)	12,340 ft^2	0.03 †	26,410 †		1	26,410	
1.1.3.2	Dump Charge (ECHOS 17 02 0409) (0.0275 cy/cf - RACER 33.03.77)	cy	3.13	4.17		4,072	29,727	
								57,865
					Total Direct Capital Costs			**23,511,277**

Notes:

1	Extended cost includes adjustment factors listed on Table C-7
cf	Cubic foot
cy	Cubic yards
ECHOS	Environmental Cost Handling Options and Solutions Unit Cost Book (R.S. Means Company and Delta Technologies Group, Inc. 1997)
RACER	Remedial Action Cost Engineering and Requirements (Delta Technologies Group, Inc. 1997)
ft^2	Square feet

Unit costs are the same as those presented in the Draft Final Feasibility Study for FISCO Alameda, except where noted.

† Unit costs are calculated by multiplying unit costs presented in the Draft Final Feasibility Study for FISCO Alameda by the ratio of the areas of the sites (63.1/143).

Table C-6

Excavate Marsh Crust, Haul to Stockpiles, Stockpile, and Backfill Clean Overburden

Alameda Point East Housing Area

Task	Description	Unit	Unit Cost($) Labor	Equip.	Materials	All Inclusive[1]	Quantity	Extended Cost ($)[2]	Task Total ($)
1	**Direct Capital Costs**								
1.1	**Site Security**								
1.1.1	Fencing (RACER 33.03.05.05)	LF	13.82	4.73	25.31		7,200	315,792	
									315,792
1.2	**Decontamination Facility (300 square ft)**								
1.2.1	Capital Costs (RACER 33.17.98.01)	LS	1,675	132	5,698		2	15,010	
1.2.2	Operation Costs for 6 Months (RACER 33.17.98.99)	LS	14,859	61	3,069		2	35,978	
									50,988
1.3	**Sheet Pile Around Site**								
1.3.1	Steel Sheeting Installation, Pull, and Salvage (ECHOS 17 03 09 04	ft^2	4.73	2.90	10.96		72,000	1,338,480	
									1,338,480
1.4	**Dewatering Excavation and Water Treatment**								
1.4.1	Pumping Water from Excavation and Package Plant (ECHOS)	MG				20,000	19	370,076	
1.4.2	Package Plant 0.14 Million Gallons per Day (RACER 33.03.68.01)	LS			377,356 †		1	377,356	
									747,432
1.5	**Excavation**								
1.5.1	Top 5 ft of Dry, Clean Soil with Scraper (haul of 20% volume included) (RACER 33.03.98.01)	cy	0.20	0.46			509,007	335,944	
1.5.2	Dragline from 5 to 9.5 ft bgs Formerly Wet (Means 1997)	cy				1.39	458,106	636,767	
									972,712

Table C-6

Excavate Marsh Crust, Haul to Stockpiles, Stockpile, and Backfill Clean Overburden

Alameda Point East Housing Area

Task	Description	Unit	Unit Cost($) Labor	Equip.	Materials	All Inclusive[1]	Quantity	Extended Cost ($)[2]	Task Total ($)
1.6	**Hauling to Stockpile**								
1.6.1	Top 5 to 8 ft of Clean Soil (assume 10% of volume hauled to stockpile area, the rest piled near excavation) Hauled 4,000 ft One Way to Stockpile Area (RACER 33.03.87)	cy	0.28	1.14			39,703	56,378	
1.6.2	8 to 9.5 ft bgs Hauled 4,000 ft One-Way to Treatment Area or Disposal of Staging Stockpile (RACER 33.03.87)	cy	0.28	1.14			198,513	281,888	
									338,265
1.7	**Stockpile Areas (2-ft earth berm, 275 ft square, 30 ft high)**								
1.7.1	Stockpile Areas for 0 to 5 ft Clean Soil (assume 20% of volume needs to be stockpiled at one time, dry soil no liquid handling)	Each					6	60,790	**364,743**
1.7.1.1	Grade 12G Dozer, 3 passes (ECHOS 17 03 0102)	yd^2	0.20	0.26			10,503	4,831	
1.7.1.2	40 Mil PVC Liner (ECHOS 33 08 0563)	ft^2	0.04		0.63		83,521	55,959	
1.7.2	Stockpile Areas for Top 5 to 8 ft Clean Soil (assume 10% of volume hauled to stockpile, the rest stockpiled near excavation)	Each					2	129,938	**259,875**
1.7.2.1	Grade 12G Dozer, 3 passes (ECHOS 17 03 0102)	yd^2	0.20	0.26			10,503	4,831	
1.7.2.2	40 Mil PVC Liner (ECHOS 33 08 0563)	ft^2	0.04		0.63		83,521	55,959	
1.7.2.3	Gravel, Placed in Two, 6-inch lifts (ECHOS 17 03 0430)	cy	3.05	2.14	15.15		3,093	62,919	
1.7.2.4	Precast Drain (ECHOS 18 02 0203)	Each	1,224.06	46	1,844		2	6,228	

Table C-6

Excavate Marsh Crust, Haul to Stockpiles, Stockpile, and Backfill Clean Overburden

Alameda Point East Housing Area

Task	Description	Unit	Unit Cost($) Labor	Equip.	Materials	All Inclusive[1]	Quantity	Extended Cost ($)[2]	Task Total ($)
1.7.3	Treatment or Disposal Staging Areas for Damp Soil 8 to 9.5 feet bgs (assume 20% needs to be stockpiled at any one time)	Each					2	129,938	**259,875**
1.7.3.1	Grade 12G Dozer, 3 passes (ECHOS 17 03 0102)	yd^2	0.20	0.26			10,503	4,831	
1.7.3.2	40 Mil PVC Liner (ECHOS 33 08 0563)	ft^2	0.04		0.63		83,521	55,959	
1.7.3.3	Gravel, Placed in Two, 6-inch lifts (ECHOS 17 03 0430)	cy	3.05	2.14	15.15		3,093	62,919	
1.7.3.4	Precast Drain (ECHOS 18 02 0203)	Each	1,224.06	46	1,844		2	6,228	
									884,494
1.8	**Backfill Volume of Clean Overburden Soil**								
1.8.1	Backfill and Compact Clean Overburden Soil (RACER 33.03.98.0	cy	1.31	1.44			1,058,734	2,911,519	
									2,911,519
					Total Direct Capital Costs				**7,559,682**

Notes:

1 Means includes loaded rates for labor, equipment, and materials
2 Extended cost includes adjustment factors listed on Table C-7
bgs Below ground surface
cy Cubic yards
yd^2 Square yards
ECHOS Environmental Cost Handling Options and Solutions Unit Cost Book (R.S. Means Company and Delta Technologies Group, Inc. 1997)
RACER Remedial Action Cost Engineering and Requirements (Delta Technologies Group, Inc. 1997)
ft Feet
ft^2 Square feet
LF Linear feet
LS Lump sum
MG Million gallons
PVC Polyvinyl chloride
Unit costs are the same as those presented in the Draft Final Feasibility Study for FISCO Alameda, except where noted.
† Unit costs are calculated by multiplying unit costs presented in the Draft Final Feasibility Study for FISCO Alameda by the ratio of the areas of the sites (63.1/143).

Table C-7

Adjustment Factors, Marsh Crust
Alameda Point East Housing Area

Note[1]	Description	Multiplier Factor Labor	Equip.	Materials
1	All work at Level D except construction of decontamination area at Level E			
2	Contractor Overhead and Profit Multiplier is equal to:	1.55	1.10	1.10
3	Escalation from 1997 dollars to 1998 (ENR 1998)	1.006	1.006	1.006
4	Costs adjusted for location by factor of:	1.18	1.18	1.18

Indirect Costs	**All Alternatives**
Project Management	10%
Engineering	15%
Permits	1%
Contingency	5%

Notes:

1	For RACER, ECHOS, and CostPro values, Notes 1 through 4 apply. For Means values, Notes 1, 3, and 4 apply.
ENR	Engineering News Record (McGraw-Hill)
RACER	Remedial Action Cost Engineering and Requirements (Delta Technologies Group, Inc. 1997)
ECHOS	Environmental Cost Handling Options and Solutions Unit Cost Book (R.S. Means Company and Delta Technologies Group, Inc. 1997)
CostPro	CostPro Closure and Post-Closure Estimating Software Users Manual (Tetra Tech EM Inc. 1997)
Means	Means Heavy Construction Cost Data (Means 1997)

Table C-8

Assumptions for Estimating Soil Volumes

Alameda Point East Housing Area

Item	Description	Quantity	Comments
	Total acreage	63.1	
	Time to complete (years)	0.50	6 months
1	**Dry Soil - 0 to 5 ft bgs**		
	Soil will be dry and will be removed and hauled with 34-cy scrapers with D91 dozers (Means 1997a, ECHOS 33.03.98).		
	Depth (ft)	5	
	Volume to excavate (bcy)	509,007	
	Excavation rate (bcy/hour)	690	
	Scraper years	0.3	8 hours/day, 6 days/week, 51 weeks/year
	Number of scrapers	1	
2	**Damp Soil - 5 ft bgs to Bottom of Marsh Crust**		
	Damp soil will be removed by 4-cy-capacity dragline (Means 1997b, p. 355) with 95-ft boom.		
	Depth to top of marsh crust (ft)	8	
	Depth to bottom of marsh crust (ft)	9.5	
	Volume of damp, clean soil (bcy)	305,404	
	Volume of damp, dirty soil (bcy)	152,702	
	Total volume to excavate (bcy)	458,106	
	Excavation rate (bcy/hour)	155	
	Dragline years	1.2	8 hours/day, 6 days/week, 51 weeks/year
	Number of draglines	3	

Table C-8

Assumptions for Estimating Soil Volumes

Alameda Point East Housing Area

Item	Description	Quantity	Comments
3	**Amount to be Hauled and Stockpiled**		
	Stockpile base diameter (ft)	275	Engineering judgement
	Stockpile height (ft)	30	Engineering judgement
			Formula for conical stockpile: Volume (cf) = 0.2618 * D^2 * H (D = diameter (ft), H = height (ft)) (Glover 1996)
	Volume per stockpile (cy)	21,998	
3a	**Scraper loads from 0 to 5 ft bgs**		
	Assume 20 percent of soil will be stockpiled at a time, other portions will be excavated or backfilled (cy).	132,342	Includes 30% swell factor
	Number of stockpiles	6	
3b	**Damp soil from 5 ft bgs to top of marsh crust**		
	Assume 10 percent of soil will be hauled and stockpiled, the rest will be placed in non-engineered stockpiles near the excavation (cy).	39,703	Includes 30% swell factor
	Number of stockpiles	2	
3c	**Damp soil to be treated (cy)**		
	Assume 20 percent of soil will be stockpiled at a time, other portions will be excavated or backfilled (cy).	39,703	Includes 30% swell factor
	Number of stockpiles	2	

Table C-8

Assumptions for Estimating Soil Volumes

Alameda Point East Housing Area

Item	Description	Quantity	Comments
4	**Thermal Desorption**		
	Volume of soil to treat (cy)	198,513	Includes 30% swell factor
	Soil density (ton/cy)	1.5	
	Treatment rate (ton/hour)	155	
	Thermal treatment years	0.3	24 hours/day, 6 days/week, 51 weeks/year
	Number of treatment units	1	
5	**Backfill of Clean Overburden Soil**		
	Volume of Dry, Clean Soil (cy)	661,709	Includes 30% swell factor
	Volume of Wet, Clean Soil (cy)	397,025	Includes 30% swell factor

Notes:

bcy	Bank cubic yards
bgs	Below ground surface
cy	Cubic yards
ECHOS	Environmental Cost Handling Options and Solutions Unit Cost Book
ft	Feet

Table C-9

Building Demolition Assumptions
Alameda Point East Housing Area

Building Material	Number of Stories[1]	Percent	Square Feet[2]	Cubic Feet[3]	Cubic Yards
Wood	2	75	1,851,005	22,212,054	710,786
Wood	4	4	197,440	2,369,286	75,817
Steel	2	20	493,601	5,923,214	200,797
Brick	1	1	12,340	148,080	4,072

Notes:

Total acreage of structures in FISCO Alameda from GIS data and site visit = 64.2
Assume same percentage of structures in Alameda Point East Housing Area = 64.2/143 = 44.9%
Total acreage of structures in Alameda Point East Housing Area = 44.9% * 63.1 acres = 28.3 acres

GIS Geographic Information System
1 Buildings have 12-foot stories.
2 Total acreage of structures * percent * number of stories * 43,560 feet^2/acre.
3 See Table C-10 for conversion factors.

Table C-10

Conversion Factors

Alameda Point East Housing Area

Initial Unit	Relation to Other Units	Comments
Acre-ft	1613.33 cy	
Excavation working hours	4.08E-04 years	8 hours/day, 6 days/week, 51 weeks/year
Thermal working hours	1.36E-04 years	24 hours/day, 6 days/week, 51 weeks/year
bcy	1.3 cy	Swell factor
Acres	43,560 ft^2	
cf	0.032 cy	Demolition factor - wood (RACER)
cf	0.0339 cy	Demolition factor - steel (RACER)
cf	0.0275 cy	Demolition factor - masonry (RACER)

Notes:

bcy Bank cubic yard
cf Cubic feet
cy Cubic yards
ft Feet
ft^2 Square feet
RACER Remedial Action Cost Engineering and Requirements (Delta Technologies Group, Inc. 1997)

Appendix D
Summary of Public Comments
and
DTSC's Response to Comments

CLEARWATER REVIVAL COMPANY

305 Spruce Street
Alameda, CA 94501

(510) 522-2165
FAX (510) 522-8520
email: clearwater@toxicspot.com

95-3013-01

April 19, 2000

Mary Rose Cassa
California Environmental Protection Agency
Department of Toxic Substance Control
700 Heinz Avenue, Suite 300
Berkeley, CA 94710

Negative Declaration/Removal Action Workplan
East Housing Parcels 170 and 171
Alameda Point Naval Air Station Superfund Site
Alameda, California

Dear Ms. Cassa:

The following comments address the Initial Study, Negative Declaration and Removal Action Workplan for the marsh crust contamination at East Housing, Alameda Naval Air Station Parcels 170 and 171. The proposed marsh crust remedy, a threshold depth map, is similar to the precautions taken over 30 years ago during development of a hazardous waste landfill in Love Canal, New York. These types of remedies do not work.

1. Conclusions of CEQA Studies Inconsistent

The Environmental Impact Report (EIR) for the Catellus Mixed Use Development (LSA Associates, Inc., December 1999) identified the Marsh Crust Ordinance and the Covenant with DTSC as mitigation measures necessary to reduce a significant environmental impact to insignificance. To the contrary DTSC's Initial Study states that the marsh crust contamination has no environmental impacts, and the Negative Declaration proposes no mitigation measures.

DTSC's Initial Study contradicts not only this EIR but also a March 23, 1999, letter from DTSC to the US Navy, wherein the marsh crust is identified as a significant impact if brought to the surface. In the March 23, 1999, letter DTSC wrote:

> "Any statement that dismisses the potential for exposure to subsurface contamination that may be raised to the surface during construction activities may lead future property owners and regulatory agency representatives to misunderstand the nature of this very real risk. All statements that dismiss the potential for this risk must be removed from the document."

In fact, DTSC's Removal Action Workplan and Initial Study make statements that dismiss this very real risk and such statements should be removed from these documents. In addition, the covenant and marsh crust ordinance should be identified in CEQA documents as necessary mitigations.

2. Marsh Crust Ordinance Inconsistent with CERCLA Permit Waiver

Under CERCLA Section 121(e) no federal, state, or local permits are required for on-site CERCLA response actions. The Navy's, DTSC's and Alameda's attempt to require a local permit to excavate the marsh crust contamination is therefore unenforceable.

3. Marsh Crust Ordinance Inconsistent with CUPA Program

Under the Covenant, DTSC will step in to approve excavations into the marsh crust if the City of Alameda repeals its marsh crust ordinance. The covenant therefore has the affect of appropriating DTSC's discretionary regulatory authority to the City of Alameda with respect to marsh crust contamination.

The Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Chapter 6.11 Health and Safety Code Section 25404 et al.) describes the procedures for, and the limits to, delegating DTSC regulatory authority to a Certified Unified Program Agency (CUPA). Has the Secretary of the Environment qualified the City of Alameda as a CUPA? Does state law allow DTSC to delegate their regulatory authority with respect to removal actions to a CUPA?

4. Failure to Characterize the Marsh Crust at East Housing

No evidence of the marsh crust contamination has been found at the subject site. The threshold depth for the marsh crust has been arbitrarily established. No information is available on the fate and transport of groundwater contamination at the site. No evidence is available on landfill gas generation and the potential for explosion hazards caused by decaying hazardous wastes.

The only site specific information referenced by DTSC was the Navy Environmental Baseline Survey which did not test for PAHs, and a July 1999 letter from ERM-West, which reported PAH sample results without certified analytical reports, evaluated risks using average rather the 95 percent confidence limit values, and did not report sample results from a depth consistent with the marsh crust.

In proceeding with a remedy for East Housing, how can DTSC be satisfied with the level of site investigation that has been performed? How can DTSC prepare an Initial Study without the data normally found in a Remedial Investigation Report?

5. Failure to Test Marsh Crust Hypothesis

DTSC claims that the marsh crust is the result of sediment contamination by pre-World War II industries. How do PAH concentrations found in the marsh crust compare to the maximum concentrations of PAHs found in bay sediments?

6. Water Quality Impacts

Within the 700 plus acre marsh crust area that borders San Francisco Bay, have PAHs (total of all PAHs by EPA Method 610) been found in groundwater samples above the water quality control plan limit of 15 µg/L?

7. RAW Remedy Flawed

The Initial Study, Negative Declaration and RAW propose the same type of remedy that was used at Midway Village, in Daly City, California, to address PAH contamination in soils. Residents of this housing project now report chromosome abnormalities in addition to other health affects. The County of San Mateo is discussing relocation of residents and demolition of Midway Village. What has DTSC learned from their mistake at Midway Village that is being applied to East Housing?

8. Piece-meal Review

CEQA decisions frown on piece-meal review of environmental impacts such as this Initial Study and Negative Declaration.

If DTSC is under the opinion that filled marshlands beyond the Naval Air Station contain similar contamination at shallower depths; and, developments on these filled marshlands include elementary schools, day care centers, and residential housing; and, the marsh crust contamination represents a "very real risk" if brought to the surface; why has DTSC excluded this area of the marsh crust from the proposed remedy? Why has DTSC taken no action to notify property owners within the marsh crust boundaries of the potential human health risks?

As of January 2000, East Housing was included within the scope of a Feasibility Study/Remedial Action Plan proposed for the US Navy owned marsh crust. The decision to prepare a separate RAW for Parcels 171 and 172

needlessly increases the burden on the public and regulators to review these documents. A separate RAW also reduces public input to the remedy decision. The RAW delays the Navy's responses to comments it has received from the public on the marsh crust remedy.

A single document should be prepared to address the marsh crust contamination in its entirety. DTSC's piece-meal approval of a RAW based on property lines rather than the extent of contamination demonstrates that DTSC is driven by developers, and not by a duty to protect public health and the environment.

9. Cumulative Impacts

The Initial Study, Negative Declaration and RAW address 60 acres of an over 700 acre hazardous waste site. DTSC has failed to consider the cumulative impacts from such an extensive area of contamination on San Francisco Bay.

10. Environmental Justice

The Marsh Crust Ordinance and East Housing Removal Action Work Plan are an attempt to use a cleanup plan and local laws within an area of the City of Alameda to prevent state and federal environmental standards from being applied. This is a disparate environmental impact not only for the future residents of East Housing, but also on the surrounding community.

Closing

Disposal of hazardous wastes by the US Navy is solely responsible for the observed marsh crust contamination. DTSC should forego any remedy that does not address the entirety of the US Navy's hazardous waste disposal site, and establishes such a low standard of accountability for hazardous waste generators.

Respectively Submitted,

Patrick G. Lynch, P.E.
Civil/Chemical Engineer

Arc Ecology

Peace ♦ ♦ ♦ Environment ♦ ♦ ♦ Economy ♦ ♦ ♦ Society

April 19, 2000

Ms. Mary Rose Cassa, R.G.
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 94710-2721

Dear Ms. Cassa:

Please find enclosed, Arc Ecology's technical comments on the Draft Removal Action Workplan and the Negative Declaration for the East Housing Area at Alameda Point. Also included as an attachment, is a letter that Eve Bach of our office wrote in conjunction with Mr. Bill Smith and Mr. Patrick Lynch, which outlined our criticisms of the Alameda Marsh Crust ordinance, and which was submitted to the Mayor and City Council of Alameda earlier this year.

We hope that these comments and the attached letter help the DTSC in its environmental decision-making process for the East Housing area.

If you have any questions regarding this correspondence, please do no hesitate to call me at the Arc office.

Best Regards,

Ken Kloc

Ken Kloc
Environmental Analyst

p.s. Thanks for sending the ground water data.

833 Market Street, Suite 1107 ♦ ♦ ♦ San Francisco, California 94103
TELEPHONE: (415) 495-1786 ♦ ♦ ♦ FAX: (415) 495-1787 ♦ ♦ ♦ E-MAIL: *arc@igc.org*

Arc Ecology's Comments on the California DTSC's Draft Removal Action Workplan and Negative Declaration for the East Housing Area (Parcels 170 & 171) Alameda Point, Alameda, California

A. Comments on the *Draft Removal Action Workplan for Marsh Crust at the East Housing Area, Alameda Point, Alameda, California*

1. Section 2.1.1, Marsh Crust Conceptual Model

a. In the first part of Section 2.1.1, the DTSC presents its general Marsh Crust Conceptual Model, which is equivalent to the conceptual model developed by the U.S. Navy. This conceptual model is flawed in at least two ways. First, it is based upon an insufficiency of subsurface soil data. Because of the lack of data, the lateral extent of contaminated soil remains inadequately characterized. The DTSC is thus forced to speculate that a large area in the former Marsh Crust and Subtidal Zone is contaminated, even though there is a reasonable probability that only a portion of this zone may have been affected. For example, in the first paragraph of this Section, the DTSC states without supporting evidence that, "The waste spread over much of the surface of the surrounding marsh..." While the DTSC's theory of contaminant transport through the historical marsh area is not unreasonable, it nonetheless needs to be supported by a more thorough investigation.

Second, in proposing the Marsh crust hypothesis, the DTSC has ignored soil data indicating that, at least in some areas, Marsh crust contaminants can be found closer to the surface than would otherwise be indicated by the depth of the Marsh crust soil layer. For example, shallow and surface soils at Alameda Point IR Site 25 were found to contain high levels of Marsh crust-like contaminants even though the Marsh crust soil layer was not encountered in Site 25 soil samples. In addition, more limited data at the College of Alameda indicates that Marsh crust-like contamination is present in the College area at depths as shallow as 2.5 feet below ground surface (bgs). Had the DTSC considered this information in creating its conceptual model, it would not be able to claim that marsh crust contamination exists largely in a "predictable planar zone" located in the "marsh crust as originally deposited." Had the DTSC considered all the available data, it would then be forced to admit that marsh crust-like contamination may be found in shallow soils, and that more site characterization is necessary in order to fashion a health protective remedy for parcels above the Marsh crust zone, including parcels 170 & 171.

b. In the latter part of Section 2.1.1, the DTSC specifically addresses the Marsh crust problem at parcels 170 and 171, and states that, "there is no set of rational investigation objectives that can be identified that would lead to a conclusive data set. The DTSC therefore believes that it is impractical to further investigate the marsh crust." However, the DTSC provides no justification, statistical or otherwise, for these unusual claims. Arc Ecology maintains that DTSC should have required both the Navy and Catellus, Inc. to obtain deep samples during previous soil investigations at Parcels 170 and 171. In general, we recommend further characterization of all the Marsh Crust and Subtidal Zone parcels. Adequate characterization at the subject parcels would consist of sampling between 2 feet bgs and the depth of the marsh crust soil layer.

c. In the last paragraph of the section, the DTSC states that marsh crust contamination, "has not been detected at depths inconsistent the depositional model." As noted in comment A.1.a, this assertion is incorrect based upon data at IR Site 25 and the College of Alameda, as well as, hot-spot data at the Coast Guard Housing area.

2. Remedial Alternative 2 - Institutional Controls

The DTSC has chosen institutional controls as its preferred alternative removal action. According to the RAW, "the institutional controls would be directly implemented by the City of Alameda pursuant to the Marsh Crust Ordinance..." Arc has previously criticized the Alameda Marsh Crust Ordinance and we now attach, as part of this commentary, a letter from Eve Bach, et. al. to the Mayor and the City Council of Alameda which contains our critique of the ordinance in more detail .

Arc wishes to underscore that the main problems with the institutional controls proposed by the DTSC in the RAW (i.e., the restrictive covenant and the Alameda excavation ordinance) are that the controls:

- Do not achieve sufficient layering of multiple government agencies to implement, monitor, and enforce the provision of the covenant
- Need to include centralized information systems to track the controls
- Do not provide for dependable enforcement mechanisms, especially in the case of individual home owners and renters, who are likely to be unaware or forgetful of the controls, or else may not understand how to follow them correctly
- Do not provide for long-term sources of funding for implementation, monitoring, and enforcement, and for ongoing notification of property users in addition to property owners

We recommend that DTSC revise its institutional controls to be more consistent with the latest available standards and guidance.

3. Appendix B, Figure B-1.

Figure B-1 is included in the Removal Action Workplan as part of the City of Alameda Marsh Crust Ordinance. The figure indicates depths to the "Marsh Crust Threshold" at parcels 170 & 171, and we assume that this figure indicates the depth below which a permit will be required by the ordinance.

The threshold depths shown in Figure B-1 appear to be based solely upon the location of the Marsh crust soil layer. As such, this threshold map suffers from the same two flaws that we discussed in our criticism of the DTSC's marsh crust conceptual model. These flaws make the threshold depths in Figure B-1 insufficiently protective of future public health.

The large majority of soil samples obtained at parcels 170 & 171 were taken in the soil layer between 1 to 2 feet bgs, and there is little information on the PAHs in soil between 2 feet bgs and the marsh crust soil layer. By adopting Figure B-1 in the Removal Action Workplan, the DTSC would allow nonpermitted

excavations deeper than six feet over more than half of the site, and in some cases, would allow nonpermitted excavations as deep as 10 feet bgs. Arc Ecology believes that this decision is not based upon an adequate level of information about potential contamination in these subsurface soils.

We would, once again, point out that soil data at Alameda Point IR Site 25 and other areas indicates that the depth of the Marsh crust soil layer is not a consistently accurate determinant of the depth at which Marsh crust-like contamination will be found.

B. Comments on the *Draft Negative Declaration for the Removal Action Workplan for Parcels 170 and 171, former Alameda Naval Air Station*

1. Project Description-Background Section of the Negative Declaration, and Pages 1 through 8 of the "Special Initial Study"

Both of these items repeat numerous statements that were made in the Removal Action Workplan (RAW) for the subject parcels. Arc therefore repeats the relevant comments here. The following table indicates the specific statement in the Negative Declaration and Special Initial Study, and refers the reader to our original RAW comment.

Statement in the Negative Declaration	RAW Comment relevant to the Negative Declaration
1. "the waste spread over much of the surface of the surrounding marsh..."	See RAW Comment A.1.a
2. "the marsh crust is believed to exist throughout the area in a reasonably predictable, planar zone..."	See RAW Comment A.1.a
3. "DTSC believes that there is no set of rational investigation objectives that can be identified which would lead to a conclusive data set."	See RAW Comment A.1.b
4. "since marsh crust has not been detected at depths inconsistent with the depositional model, DTSC considers the likelihood of substantial marsh crust or subtidal soil deposits at depths different from those of the original marsh crust or subtidal surface to be minimal"	See RAW Comment A.1.a and A.1.c

2. Findings of Significant Effect on the Environment

a. Arc disagrees with the DTSC's finding of no significant effect on the environment, and we maintain that potentially significant impacts could result from implementation of the RAW at the subject parcels. As we have discussed in our RAW comments, the DTSC has based its findings upon an insufficient level

of site characterization, and has also developed a conceptual model for the march crust zone that is inadequate for health protective decision-making at the site.

As we have already pointed out, uncharacterized deep soils above the marsh crust threshold depth may contain unacceptable levels of PAH contamination. However, with the implementation of the RAW, the DTSC plans to allow nonpermitted excavation of these soils. Uncontrolled excavation of potentially contaminated soils could produce significant impacts to public health and safety, surface water, air, plant life, and animal life.

Arc therefore recommends further characterization at both the subject parcels, as well as, throughout the marsh crust and subtidal zones, in order to fill the current data gaps and to refine the marsh crust hypothesis.

b. The DTSC has also failed to completely analyze the potential impact to public services resulting from implementation of the RAW. For example, although DTSC has accepted the Alameda City excavation ordinance as an important component of the RAW, it has not analyzed the City's capacity to take on the environmental protection responsibilities entailed in the ordinance. Arc questions whether the City of Alameda has the capacity to successfully carry out a program of institutional controls at the subject parcels. For example, is the City of Alameda part of the State's "Certified Unified Program"?

3. Mitigation Measures

Consistent with our criticisms of the RAW, we also disagree with the DTSC's decision to forgo mitigation measures in implementing the RAW. Neither the restrictive covenant nor the City's excavation ordinance provide for a full set of institutional control mechanisms that would insure no significant environmental effects at the site well into the future. For example, the RAW does not provide any mechanism for ongoing notification to parcel occupants, regarding the land-use controls stipulated in the covenant and the ordinance. In this particular instance, Arc recommends the use of signage and yearly notification letters as an appropriate mitigation. We have also attached, as part of our comments, a more extensive discussion of the deficiencies in the excavation ordinance, which includes a section on the development of effective institutional controls (see: Letter from Eve Bach, et. al. to the Mayor and City Council of Alameda).

Attachment to Arc Ecology's Comments on the California DTSC's Draft Removal Action Workplan and Negative Declaration for the East Housing Area (Parcels 170 & 171) , Alameda Point, Alameda, California

Letter from Eve Bach, Bill Smith, and Patrick Lynch to the Mayor and City Council of Alameda February 15, 2000

February 15, 2000

To: Mayor and Members of the City Council

From Eve Bach — Arc Ecology
Dr. Bill Smith — Sierra Club
Patrick Lynch — Clearwater Revival Company

RE: Marsh Crust Excavation Ordinance

SUMMARY

Public comments at your meeting of January 18 pointed out that the Marsh Crust Excavation Ordinance suffers from two types of problems: the Ordinance is too sweeping and strict, and at the same time it is too lax and fails to protect human health and the environment.

It will probably surprise you to know that we agree with both positions. We ask you to reconsider your support for the second reading of the Ordinance.

THE NAVY'S THEORY OF MARSH CRUST CONTAMINATION

As you know, the Marsh Crust is a former wetland that was used as a dump before it was acquired and filled by the Navy. The Navy's theory is that current contamination problems (primarily polyaromatic hydrocarbons, including cancer-causing benzo(a)pyrene) were caused by wastes deposited in the marsh by the Pacific Coast Oil Works plant and two gasification plants on the Oakland side of the Estuary. (See Map 1) If the Navy's theory is correct, it would mean that the property had been contaminated when it was under City, not Navy control.

The Navy's theory is not an unreasonable starting point for an investigation of the site. But like all theories, it needs to be verified or modified by factual evidence. The normal way to test this theory would be to sample soil at the depth of the old marsh, starting at the suspected source of the problem, continuing outwards to determine how far and in what directions the contamination had migrated. If the contamination levels were consistently lower in samples taken further away from the suspected source, the Navy's theory would be validated.

Unfortunately the NAS and FISC cleanup programs have not attempted to verify the Navy's theory. There has been little deep sampling within the Marsh Crust area, and none whatsoever at East Housing. Cleanup remedies proposed so far are based on the assumption that the Navy's theory is valid, without any confirming evidence. The cleanup remedy that has been proposed for East Housing and FISC is a prohibition against digging deeper than 5 feet on the former bases (except for the areas in federal ownership) without a City permit. The prohibition would be delivered as a covenant attached to the property deed; the Ordinance establishes the program that would issue excavation permits.

THE MARSH CRUST EXCAVATION ORDINANCE IS TOO SWEEPING AND DRACONIAN.

The restrictions on digging that will apply to future property owners (including East Housing homeowners) are based on the *assumption* that all of the marsh crust and subtidal areas are

contaminated. The key word is "assumption." Since the Navy's cleanup program that was supposed to investigate contamination on the bases never took deep samples at East Housing or on most of the FISC, there is no evidence that the marsh crust contamination has spread to those locations.

Even though there is no evidence that the entire marsh crust is contaminated, future property owners will be burdened with very expensive requirements if they decide to dig deeper than five feet. Homeowners and businesses will be required to

- sample and test the soil or assume soil is hazardous;
- hire a registered engineer or geologist to develop a construction site management plan and oversee compliance;
- hire a certified industrial hygienist to develop a health and safety plan
- potentially put up a performance bond
- comply with all laws and regulations pertaining to hazardous wastes, including disposal at a toxic waste dump site.

IF CONTAMINATION IS LESS THAN ASSUMED, THE CITY WILL LOSE AND THE DEVELOPER WILL GAIN.

Theoretically the City's Ordinance will shift the responsibility and costs of soil sampling and testing from the Navy to the future owners: to the City (who will excavate the site to install new infrastructure), to developers (who will excavate during construction), and to the future homeowners and businesses that Alameda is trying to attract to the former bases.

In reality, however, by the time homeowners and businesses purchase Marsh Crust properties from the developer, more information about the extent of contamination will be available. The City will do extensive excavation to install new infrastructure before construction, and will be obligated by the Ordinance to test the soil. It is likely that the prices that the homeowner and business pay will incorporate information provided by the tests about the property's environmental condition. A parcel that is contaminated will cost less than one that turns out, after its soil has been tested, to be clean.

It is also likely that developers will be protected from unanticipated costs, because the price they pay to the City will be based on the assumption that the property is contaminated. The City intends to acquire base properties and immediately reconvey them to the developer. It is predictable that the price the developer will pay will reflect a worst case assumption; that is, the price will incorporate the assumption that the entire property is contaminated. The price the developer pays will discount the maximum costs of complying with the excavation restrictions.

Ironically, the City stands to lose substantially if the property turns out to be less contaminated than assumed. By federal law, the City will acquire base properties at no cost, whether they are contaminated or clean. It appears that the City will negotiate a sale price before it is known to what extent this assumption is valid. **If the property is cleaner than assumed, the City will have sold the property to the developer for less than it is actually worth.**

THE MARSH CRUST ORDINANCE IS NOT STRICT ENOUGH; IT DOES NOT PROTECT HUMAN HEALTH AND THE ENVIRONMENT.

For areas within the Marsh Crust that actually *are* contaminated, the Ordinance does not provide sufficient protection. When the City Council adopted the Ordinance on first reading, a map of threshold depths had not yet been prepared. Now a map has been proposed that **assumes** that all contamination is deeper than five feet; i.e., that all soil down to five feet is clean.

If the land fill in the marsh crush had never been disturbed over the last eighty years, this assumption might be reasonable. However, that is not the case. In the past, utility lines have been laid; construction and demolitions have occurred, with likely regrading of the site. Without sampling it is not possible to know locations where contamination that was originally at the bottom of the fill has been brought closer to the surface than five feet. Estuary Park is an example of one site where contamination was found at surface levels (and ignored until citizen complaints forced fencing of the area).

The Ordinance and the Covenant are also too lax for areas of the site where there actually is contamination because they do not meet emerging standards for institutional controls. Alameda recently had a study prepared by Ellen Garber of Shute, Mihaly & Weinberger, that concluded that institutional controls (of which the Covenant and Ordinance is an example)

(a) should involve layers of multiple government agencies to implement, monitor, and enforce the provisions;
(b) need centralized information systems;
(c) require dependable enforcement mechanisms; and
(d) long term sources of funding for mplementation, monitoring, and enforcement.

Alameda's Ordinance does not measure up to these recommended criteria:

(a) **Layering** - For all practical purposes, the Covenant-Ordinance scheme that Alameda intends to use relies almost exclusively on the City of Alameda for implementation, monitoring, and enforcement. A DTSC official agrees with our assessment that the State *delegates* implementation of the restrictions to the City through the Covenant, rather than layering City efforts as a supplement to State efforts.

(b) **Information systems** - There is no requirement to establish an information system in the Ordinance. When the Ordinance was presented for first reading, there was no recommendation or notice by the staff that the additional expense of such a system will be incurred to implement the Ordinance

(c) **Dependable enforcement mechanisms** - Enforcement of the Ordinance relies on an infraction process that trivializes violations. There is no provision in the Ordinance for stop work orders, or declaring a public health hazard when violations occur. There is no provision for city officials to gain entry to a property where a violation is suspected.

(d) **Long term funding** – The Ordinance provides for a permit application fee. In California, the fee can only apply to the costs associated with the individual permit.

There is no provision for monitoring and enforcement, or for public education about the permit requirements.

TIMING OF THE ORDINANCE

When the marsh Crust Excavation Ordinance came before you for first reading, the Council and the public were told that DTSC was urging the City to adopt this Ordinance immediately. In a meeting with DTSC, we learned that they are puzzled why the City is in such a hurry to adopt this Ordinance now since the Covenant is not yet in final form.

It was clear from the Council's January 18th discussion that the Council does not fully grasp the content or long term implications for the City of adopting this Ordinance. That is not surprising since the topic of institutional controls is new, controversial, and technical. Nonetheless, questions and concerns raised by the public need to be addressed with substantive, accurate responses rather than dismissed as inconvenient annoyances.

The Council would do well to delay the second reading until their questions and the public's concerns have been fully explored.

ENVIRONMENT REVIEW

The City's asserts that this Ordinance is not a project under CEQA because it is certain that adoption of the permitting program "will not involve or require any physical activities other than optional testing of excavated materials and, ...because there is no possibility that the enactment of the ordinance may have a significant effect on the environment."

This assumption is inconsistent with the facts.

- First, the Ordinance permits excavation above the five foot threshold depth even though soil mixing from previous disturbance of the Marsh Crust fill could have caused contamination at a depth less than five feet.

- Second, the Ordinance establishes a program with the authority to make ministerial decisions to issue excavation permits. Council approval of this program in effect approves future permits. No subsequent opportunities will exist for the City to exercise discretion in its review of specific permit applications. There will be no opportunities for public review, even if a future homeowner is concerned about an adjacent neighbor's plans to excavate sequested hazardous wastes.

Subjecting this Ordinance to environmental review would provide the public dialog that could cure its numerous flaws.

CONCLUSION

We strongly recommend that the Council table the second reading of this Ordinance. Council members need to consider the views of the public, including those willing to share their expertise about institutional controls. The Restoration Advisory Board is the only group to review this Ordinance prior to its appearance on the Council agenda. They have expressed serious reservations about the Ordinance. An Ordinance that has been subjected to public scrutiny will better serve the City's financial as well as environmental interests.

RESPONSE TO COMMENTS ON DRAFT NEGATIVE DECLARATION AND DRAFT REMOVAL ACTION WORKPLAN FOR PARCELS 170 AND 171 (EAST HOUSING), FORMER ALAMEDA NAVAL AIR STATION (ALAMEDA POINT), ALAMEDA, CALIFORNIA

Comments were received from Arc Ecology (AE) and Clearwater Revival Company (CRC). The specific comments are referenced with each response.

Marsh Crust Characterization

Lack of data; insufficient investigation (AE-A.1a; AE-A.1.b; AE-B.1.; CRC4; CRC5) DTSC believes that further characterization would not reduce the extent of the institutional control remedy sufficiently to justify the effort. DTSC agrees that there is a reasonable probability that only a portion of the area within the conceptual model boundary of the marsh crust is actually contaminated. However, the precise locations of marsh crust areas not affected by contamination cannot be identified in any reasonable investigation scenario adequately to allow for reduction of the restriction contained in the proposed remedy. In the conceptual model, the marsh crust has a finite edge that can be found with sufficient data, but additional data within the marsh crust area would not provide sufficient evidence of lack of marsh crust in specific places to warrant limiting the scope of the restrictions for the interior portion of the marsh crust at this time.

Based on the conceptual model for the deposition of the marsh crust, the contamination at Parcels 170 and 171 and much of the FISC Annex and former Alameda Naval Air Station pre-dates Navy presence at Alameda Point. Nevertheless, the Navy as landowner has accepted responsibility for evaluating and proposing necessary remedies for the contamination. DTSC will continue to oversee the Navy's remediation of marsh crust contamination at the FISC Annex and the remainder of the Alameda Naval Air Station to ensure the nature and extent are adequately characterized and that appropriate standards for protection of public health and the environment are met.

DTSC does not agree that Catellus or any agent other than the Navy is required to carry out investigations of Navy property. To the extent that information and data have been generated by other agents, and only to the extent that such information and data are determined to be properly applicable to the decision before DTSC, such information may be used.

DTSC does not agree that the threshold depth for marsh crust has been arbitrarily established. Rather, that depth is based on data presented or cited in the Draft Removal Action Workplan. Potential groundwater contamination has been evaluated using information regarding gradient, and using data obtained by Catellus. Soil gas surveys in areas known to have highly contaminated marsh crust at depth have not yielded any indication of potential hazards from decaying organic matter; therefore, it is not expected that such hazards would exist at Parcels 170 and 171.

DTSC's evaluation of PAH data at Parcels 170 and 171 did not rely solely on risk calculations. Measured concentrations at each sample location were evaluated. Screening-level data was deemed appropriate for determining that potential unacceptable risks do not exist. DTSC believes that the data present a rational basis for the decision.

Comparison of PAH concentrations found in marsh crust to those found in San Francisco Bay sediments are not relevant. DTSC's presumption that the marsh crust contamination is associated with industrial contamination in Bay sediments is merely informational. The decision rests on DTSC's analysis of the presence and present location of the marsh crust.

Contamination in soil above the marsh crust (AE-A.1.a; AE-A.1.c; AE-B.1)
In the conceptual model, the marsh crust is a discrete depositional layer of a unique and definable soil type. In the model, some areas within this definable layer are contaminated. The processes that resulted in the marsh crust layer, and the processes that resulted in contamination in some regions of the marsh crust, are distinct from processes that resulted in the presence of other soil layers and processes that may have resulted in contamination of those other soil layers. Because the marsh crust layer, with its associated contamination, is unique and independent in extent, location, and deposition, DTSC believes that evaluation of a remedy addressing only marsh crust is warranted.

DTSC agrees that data indicate PAH contamination may be present throughout the layer soil column and distinct from contamination associated with marsh crust. Studies conducted at the College of Alameda and IR Site 25 at Alameda Point are not relevant to Parcels 170 and 171. DTSC evaluated data for Parcels 170 and 171 which were generated by the Navy and by Catellus and concluded that the data, (including data which were obtained for purposes other than our decision making) were sufficient for screening purposes. DTSC further concluded, based on these data, that no further investigation or remediation is necessary at Parcels 170 and 171 for purposes other than marsh crust.

Threshold depths (AE-A.3)
The proposed removal action is not intended to satisfy cleanup requirements for marsh crust outside of Parcels 170 and 171. The map that is part of the ordinance addresses a larger area than depicted for the remedy under consideration here. DTSC relied on visual observation of subsurface cores from Parcels 170 and 171 to assess the depth to the base of fill (where marsh crust would be expected to occur). Data from areas other than Parcels 170 and 171 at Alameda Point and the FISC Annex indicate that elevated concentrations of PAH within the fill are associated with elevated concentrations near the surface. DTSC believes adequate characterization was completed at Parcels 170 and 171.

The commenter is correct in observing that approvals are not required for excavation to depths where marsh crust may not be encountered. Because DTSC has determined that contamination is unlikely to exist at Parcels 170 and 171 anywhere other than the marsh crust, DTSC has determined that additional controls are not necessary.

PAH in Groundwater (CRC6)

Occurrences of PAH in groundwater at locations outside Parcels 170 and 171 that exceed water quality control plan limits are not relevant at Parcels 170 and 171. Analytical results from Parcels 170 and 171 indicate there are no exceedences.

Institutional Controls as the Preferred Alternative (AE-A.2; CRC7)

The land use covenant is the enforcement mechanism for the proposed remedy. DTSC is using available local government action to buttress the underlying remedy. DTSC may not compel the City to adopt or enforce any ordinance, including the one regulating excursion into the marsh crust. DTSC is, therefore, not relying on the City ordinance as a means to enforce the remedy that will ensure that the controls remain in force and in effect, should the City rescind its ordinance or amend it in a manner that is inconsistent with the remedy. Yearly review of City-approved projects is sufficient, as long as the ordinance is in effect.

Pursuant to Assembly Bill 871, which became effective on January 1, 1999, DTSC is required to maintain a list of all land use restrictions recorded pursuant to Health and Safety Code sections 25200, 25200.10, 25202.5, 25222.1, 25229, 25230, 25355.5, and 25398.7. At a minimum, this list must provide the street address, or if a street address is not available, an equivalent description of location for a rural location or the latitude and longitude of each property. DTSC is also required to update the list as new land use restrictions are recorded, and make the list available to the public, upon request, and place the list on the DTSC Internet website. DTSC is evaluating our system for tracking the effectiveness of institutional controls, but this evaluation should not delay such remedies, including the one before us. Alternatives to institutional controls, such as excavation of marsh crust, are infeasible. The contaminated layer at depth cannot be removed without incurring onerous and unnecessary cost and disruption to the community. The only other alternative is complete prohibition of any residential use.

The land-use covenant will be recorded and will run with the land. The restrictions must be incorporated into all subsequent deeds and leases. DTSC does not agree that comparison to Midway Village is relevant. At Midway Village high levels of PAH contamination were found at the surface and remediated; investigations at Alameda Point Parcels 170 and 171 have indicated only the possibility of contamination at depth. The available evidence indicates that all exposure pathways for the marsh crust are incomplete (hence, no unacceptable risk to human

health and the environment), with the exception of excavation or intrusive subsurface activities.

Finding of No Significant Effect (AE-B.2)

DTSC believes that the decision with regard to marsh crust is protective with a significant margin of safety, including that it applies across the whole site and requires testing of soil to demonstrate that it is clean

Mitigation Measures (AE-B.3)

Notification is included in the proposed land-use covenant. Notification is an integral part of the remedy, and is not a mitigation measure, because it is necessary to protect public health and the environment.

Relationship to Other CEQA Studies (CRC1)

The City's EIR concerns a proposed development project (the Catellus Mixed Use Development) which, should the project proceed without controls on excavation into the marsh crust, could pose a threat to public health and the environment. The project evaluated in DTSC's negative declaration is a remedy for the marsh crust. DTSC has determined, based on available evidence, that the restrictive covenant remedy will have no significant effects on the environment. DTSC commented in a March 23, 2000 letter to the Navy that the Navy's position that no remedy was required for marsh crust was untenable. Our decision to implement the proposed remedy is based on our determination that a remedy is required. DTSC does not believe that the Draft Removal Action Workplan or the Draft Negative Declaration dismisses risks posed by marsh crust, but rather addresses those risks directly.

Marsh Crust Ordinance and CERCLA Permit Waiver (CRC2)

The proposed remedy does not involve a local permit to remediate marsh crust soils. DTSC is using available local government action to buttress the underlying remedy. DTSC may not compel the City to adopt or enforce any ordinance, including the one regulating intrusion into the marsh crust.

Marsh Crust Ordinance and CUPA Program (CRC3)

The City of Alameda is not a CUPA, and even if it were, it is not enacting the Marsh Crust Ordinance in its role as a CUPA. The Ordinance is not a delegation of authority from DTSC to the City. The City is enacting the Ordinance pursuant to its constitutional municipal powers.

CUPAs already have authority to issue orders under HSC section 25187 to require removal and remedial action necessary to address imminent and substantial endangerment. If there is no imminent and substantial endangerment, HSC section 25404.1 prohibits a CUPA from issuing a clean-up order unless DTSC has determined the CUPA is qualified pursuant to regulations. Those regulations have not been promulgated, and thus no CUPAs have been deemed qualified. HSC section 25404 also prohibits CUPAs from issuing removal and remedial action orders for many types of sites that are already subject to clean-up actions under the jurisdiction of other agencies such as DTSC and/or regional water quality control boards.

Coherent Review (CRC8)

While DTSC generally agrees that separate CEQA documents are not desirable, it is also important to provide timely opportunities for public comment, especially on controversial issues. This determination for Parcels 170 and 171 clearly identifies the intersection between DTSC's duty to protect human health and the environment and the community's stated need for reuse. In an effort to facilitate reuse, this determination can be accomplished separately from determinations regarding marsh crust in areas of Alameda Point and the FISC Annex other than Parcels 170 and 171, while still fulfilling DTSC's obligations under CEQA to analyze significant effects on the environment from the proposed remedy. As to the issue of potential contaminated Marsh Crust underlying adjacent non-Navy property, DTSC will consider such contamination in the future.

Cumulative Impacts (CRC9)

The project site is not adjacent to San Francisco Bay, and contaminant fate and transport studies do not indicate the potential for adverse impacts to the Bay. Therefore, DTSC does not believe the proposed remedy poses any cumulative impacts to San Francisco Bay.

Federal Environmental Justice Policy (CRC10)

State law (California Health and Safety Code including the National Contingency Plan, California Civil Code, and applicable regulations), are being applied at this site. Comments regarding implementation of federal law should be addressed to the Navy.